User's Manual

EBC5410

All-in-One NS Geode GX1 Single Board with LCD, AC97 Audio, 10/100Base-Tx Ethernet Interface, 4COMs, & Optional LVDS, DSTN Companion Chip

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4. Carefully pack the defective product, a complete Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.

5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

Packing List

Before you begin installing your single board, please make sure that the following materials have been shipped:

- 1 EBC5410 All-in-One NS Geode GX1 Computing Module
- 1 Quick Installation Guide
- 1 CD-ROM contains the followings:
  - User's Manual (this manual in PDF file)
  - Ethernet driver and utilities
  - VGA drivers and utilities
  - Audio drivers and utilities
  - Latest BIOS (as of the CD-ROM was made)

If any of these items are missing or damaged, please contact your distributor or sales representative immediately.

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Document Amendment History

Revision	Date	By	Comment
1st	Oct. '01.	Philip Chang	1. Initial Release

1. Manual Objectives

This manual describes in detail the BCM Technology EBC-5410 Single Board.

We have tried to include as much information as possible but we have not duplicated information that is provided in the standard IBM Technical References, unless it proved to be necessary to aid in the understanding of this board.

We strongly recommend that you study this manual carefully before attempting to interface with EBC-5410 or change the standard configurations. Whilst all the necessary information is available in this manual we would recommend that unless you are confident, you contact your supplier for guidance.

Please be aware that it is possible to create configurations within the CMOS RAM that make booting impossible. If this should happen, clear the CMOS settings, (see the description of the Jumper Settings for details).

If you have any suggestions or find any errors concerning this manual and want to inform us of these, please contact our Customer Service department with the relevant details.

2. Introduction

2.1 System Overview

The EBC-5410 is a compact 5.25" CD-ROM size Single Board Computer that equips with NS Geode GX1 processor, LCD interface, AC97 Audio, PCI-bus Ethernet interface, and 64MB SDRAM onboard.

Targeting on the rapid growing information appliance and embedded system markets, the EBC-5410 comes designed with a PCI-bus Realtek RTL8139C 10/100Base-Tx Ethernet controller, TFT flat panel interface, and 4 serial ports. Making it a perfect solution for not only popular information appliance devices like WBT (Windows Based Terminal), Thin Client, STB (Set Top Box), Web Phone but also Retail/Financial Transaction Terminals.

Unlike others in its kind, the EBC-5410 comes with an optional companion NS CS9211 DSTN LCD controller, which allows you to connect EBC-5410 with low-cost DSTN color or mono LCD's. In addition, a 4-bit TTL digital input & 4-bit TTL digital output interface is also implemented. These make the EBC-5410 also ideal for multimedia POS/KIOSK Terminals that require low-cost but reliable Single Board Computer.

Further more, the optional 18-bit LVDS transmitter and onboard 64MB SDRAM make the EBC-5410 also an excellent fit for wide-range embedded system requirements.

Other impressive features include a built-in AC97 Audio, a Compact Flash socket for type I/II Compact Flash storage card, one optional 32-pin DIP socket that supports M-Systems DiskOnChip 2000 series flash memory up to 288MB, one parallel port, and a 168-pin DIMM socket allowing for up to 256 MB of SDRAM to be installed, and a PCI slot for future expansion.

2.2 System Specifications

General Functions

- **CPU:** Onboard NS Geode GX1 300MHz (available in different speeds by special order), BGA package
- **BIOS:** Award 256KB Flash BIOS
- **Chipset:** NS Geode CS5530A
- **I/O Chipset:** NS PC97317VUL, Winbond W83977EF-AW
- **Memory:** Onboard 64MB SDRAM and one 168-pin DIMM socket supports up to 320 Mbytes SDRAM
- **Enhanced IDE:** Supports two IDE devices. Supports Ultra DMA/33 mode with data transfer rate up to 33MB/sec.
- **FDD interface:** Supports up to two floppy disk drives, 5.25" (360KB and 1.2MB) and/or 3.5" (720KB, 1.44MB, and 2.88MB)
- **Parallel port:** Internal header for bi-directional parallel port x 1. Supports SPP, ECP, and EPP modes
- **Serial port:** Three RS-232 and one RS-232/422/485 serial port. Ports can be configured as COM1, COM2, COM3, COM4, or disabled individually. (16C550 equivalent)
- **IR interface:** Supports one IrDA Tx/Rx header
- **KB/Mouse connector:** 8-pin (4 x 2) connector supports PS/2 keyboard and mouse
- **USB connectors:** One 5 x 2 header onboard supports dual USB ports
- **Watchdog Timer:** Can generate a system reset, IRQ15 or NMI. Software selectable time out interval (32 sec. ~ 254 min., 1 min./step)
- **DMA:** 7 DMA channels (8237 equivalent)
- **Interrupt:** 15 interrupt levels (8259 equivalent)
- **Power management:** Supports ATX power supply. Supports PC97, LAN wake up and modem ring-in functions. I/O peripheral devices support power saving and doze/standby/suspend modes. APM 1.2 compliant.

Flat Panel/CRT Interface (EBC-5410/EBC-5410V)

- **Chipset:** NS Geode CS5530A
- **Display memory:** Shared display memory up to 4MB
- **Display type:** Supports non-interlaced CRT and up to 18-bit TFT LCD displays. Can display both CRT and flat panel simultaneously
- **Resolution:** Up to 1280 x 1024 x 8 bpp and 1024 x 768 x 16 bpp

Flat Panel/CRT Interface (EBC-5410D)

- **Chipset:** NS Geode CS5530A / NS CS9211
- **Display memory:** 1MB display frame buffer
- **Display type:** Simultaneously supports CRT and flat panel (EL, LCD and gas plasma) displays

LVDS Interface (EBC-5410V Only)

- **Chipset:** NS DS90C363A or equivalents
- **Display type:** Supports 18-bit LVDS TFT panels

Audio Interface

- **Chipset:** NS Geode CS5530A
- **Audio controller:** AC97 ver.2.0 compliant interface, Multi-stream Direct Sound and Direct Sound 3D acceleration
- **Audio interface:** Microphone in, Line in, CD audio in, line out

Ethernet Interface

- **Chipset:** Realtek RTL8139C PCI-bus Ethernet controllers onboard
- **Ethernet interface:** PCI 100/10 Mbps, IEEE 802.3U compatible
- **Remote Boot-ROM:** For diskless system

SSD Interface

One CF socket supports Type I / II Compact Flash Card

Digital I/O Interface

4-bit TTL digital input and 4-bits TTL digital output

Expansion Interface

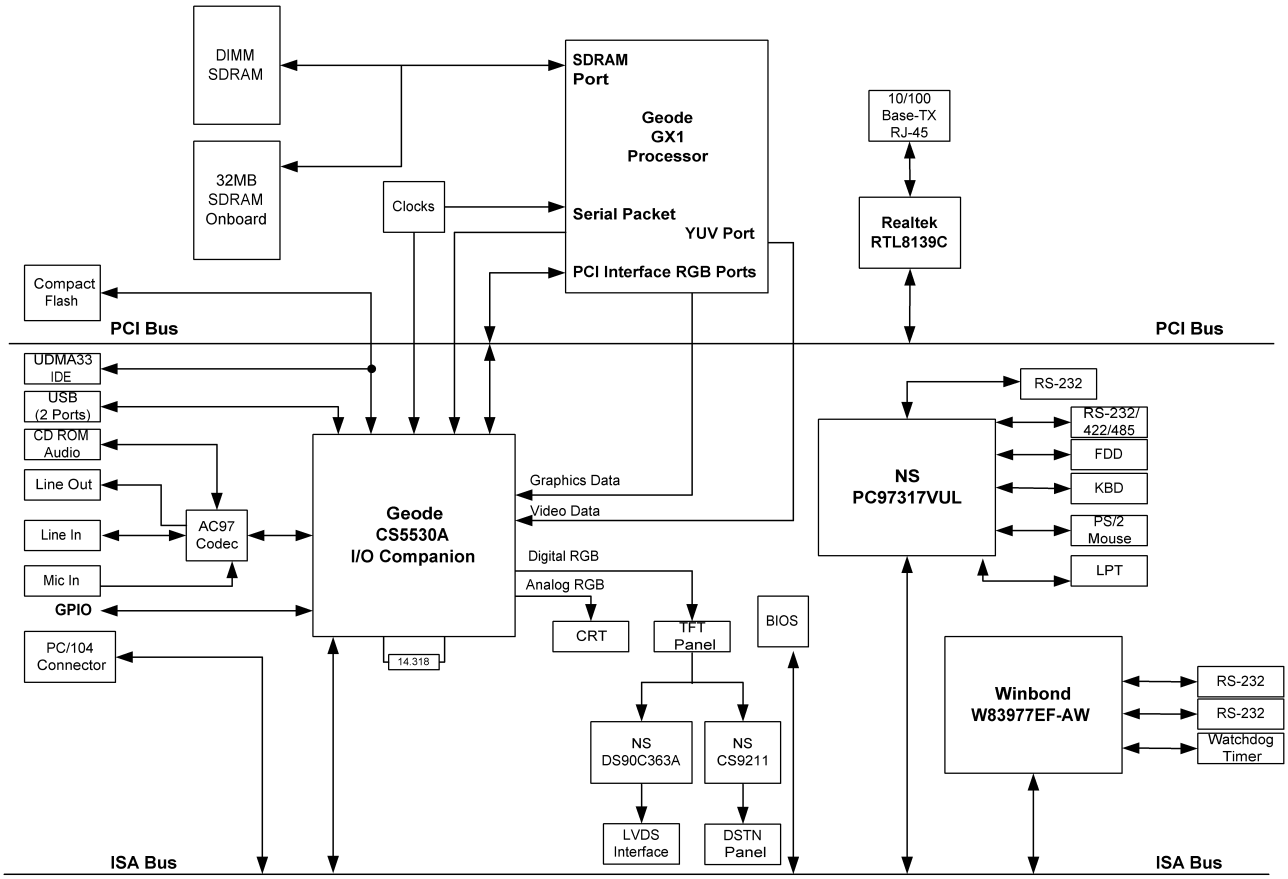
- **PC/104 connector:** One 16-bit 104-pin connector onboard
- **PCI slot:** One 32-bit PCI slot onboard

Mechanical and Environmental

- **Power supply voltage:** +5V (4.75V to 5.25V)
- **Typical power requirement:** 5V @ 2A w/ GX1 300MHz
- **Operating temperature:** 32 to 140°F (0 to 60°C)
- **Board size:** 8”(L) x 5.75”(W) (203mm x 146mm)
- **Weight:** 0.4 Kg

2.3 Architecture Overview

The following block diagram shows the architecture and main components of EBC-5410 series.



The two key components on board are the NS Geode GX1 CPU and the CS5530A companion chip. These two devices provide the ISA and PCI bus to which all the major components are attached.

The following sections provide detail information about the functions provided onboard.

2.3.1 CPU/GX1 and CS5530A

The NS Geode GX1 along with the CS5530A companion chip provide the basic functionality and buses of the system:

- Interface to SDRAM, 64-bit data bus. PC100 compliant SDRAM must be used.
- PCI interface provided by GX1 CPU.
- PCI to ISA Bridge provided by CS5530A.
- VGA controller with video memory shared with system memory (UMA). The image data is transferred to the companion chip by means of *Pixel* bus.
- CRT and TFT interface. Data provided by the *Pixel* and *Video* interface from the CPU. The TFT interface and SA part of the ISA bus share pins as described later.
- Video interface from GX1 to the CS5530A. This data-stream is buffered and multiplexed with the *Pixel* bus for windowed video viewing. This interface may assist the processor in connection motion picture decoding.
- USB integrated in the CS5530A.
- IDE interface support Ultra DMA. Tow connectors are provided: A 44 pin pitch 2.0mm standard IDE interface on the primary controller and a Compact Flash connector on the secondary controller.
- Digital audio interface to an AC97 compliant audio codec.

2.3.2 XPRESS Graphics

The XPRESS Graphics is based on the GX1 CPU and the CS5530A Companion chip and this graphics controller is very cost efficient since almost no additional components are required. This is achieved by using the SDRAM as frame-buffer and by integrating the graphics engine and display interface in the GX1 CPU and the CS5530A companion chip. This controller provides a CRT as well as a TFT interface which support the modes listed below:

The TFT panel interface is available as a parallel interface in the CN2 connector.

2.3.3 PCI Bus

The PCI-bus on the board is provided by the GX1 CPU and will always run at 33MHz.

The GX1 CPU provides support for up to three bus masters. The CS5530A and Realtek RTL8139C Ethernet controller uses these bus-mastering signals.

2.3.4 PC/104 Interface

The CS5530A companion chip provides a PCI-ISA Bridge that may operate in master or slave mode. EBC-5410 series only support ISA slave mode. ISA master mode allows an ISA board to grant the bus and thereby get the bus master status. The bus master has the ability to generate bus cycles and thereby transfer data without involvement of the CPU or DMA (Direct memory access). However, ISA add-on card, which utilizes the bus master mode, is very rare today. A 104-pin PC/104 connector is equipped onboard for future expansion.

2.3.5 SDRAM Interface

This board uses SDRAM in the 168-pin DIMM form factor. 3.3V PC 100 SDRAM modules are recommended.

2.3.6 TFT Panel Interface

An alternative display to the standard CRT monitor is a digital flat panel interface in which the color of each pixel is digitally encoded. The panel data may be transferred in parallel where the color of each pixel is transferred over a number of signal lines at rates up to 65MHz.

The parallel interface is only suitable for short distance (less than 50 cm) and is typically implemented by using of ribbon cables. One should be careful in the EMC design of the box and cabling when this interface is used.

It should also be noted that the signal level of this interface is 3.3V, but does comply with the TTL signal levels. Some - most older displays require 5V signal level.

2.3.7 Audio

The CS5530A companion chip provides audio support through an AC97 codec interface. The audio codec provides mixing of the analog signals as well as Digital/Analog conversion. The following analog interfaces are provided.

- Line-in, stereo.
- CD-ROM input, stereo.
- Microphone, single input with microphone bias circuit.
- Line-Out, stereo.

Access to the audio signals is provided by an 8 x 2 header (CN5) or by an optional audio bracket.

2.3.8 IDE Interface

A primary as well as a secondary IDE controller is provided by the CS5530A companion chip which supports Ultra DMA mode and PCI bus mastering for the data transfer.

A standard IDE 40-pin connector and a Compact Flash type II connector provide access to these controllers.

2.3.9 USB

The USB interface provides two USB channels that are controlled by the CS5530A.

The signals are provided by means of a 5 x 2 header, an optional USB bracket adapter is been use.

2.3.10 Realtek RTL8139C Ethernet Controller

The Realtek RTL8139C is a highly integrated and cost-effective single-chip Fast Ethernet controller that provides 32-bit performance, PCI bus master capability, and full compliance with IEEE 802.3u 100Base-T specifications and IEEE 802.3x Full Duplex Flow Control. It also supports Advanced Configuration Power management Interface (ACPI), PCI power management for modern operating systems that is capable of Operating System Directed Power Management (OSPM) to achieve the most efficient power management.

2.3.11 NS PC97317VUL

The NS PC97317VUL Super I/O chip provides most input / output interfaces of the system as the following:

- COM 1. Operates in RS-232 mode through a charge pump driver. Only 5V supply is required
- COM 2. A RS-232/RS-422/RS-485 driver is used whereby RS-232, RS-422 and RS-485 are provided. Using hardware jumper to makes mode selections. Driver uses charge pumps whereby only +5V is required
- LPT. Support for SPP, EPP and ECP modes
- Floppy interface
- Keyboard interface
- PS/2 Mouse interface
- IrDA interface for infrared communication. This interface shares the controller of COM2
- Provision of buffered ISA data bus for BIOS (denoted *XDBus)*
- NVRAM with battery backup for BIOS configuration and real time clock
- ACPI Controller/Extender that supports the requirements of the ACPI spec (rev 1.0)
- An APC that controls the main power supply to the system using open-drain output

2.3.12 Winbond W83977EF-AW

The Winbond W83977EF-AW Super I/O chip provides COM3 / COM4 serial port and Watchdog timer of the system as the following:

- COM 3. Operates in RS-232 mode through a charge pump driver. Only 5V supply is required
- COM 4. Operates in RS-232 mode through a charge pump driver. Only 5V supply is required

- Watchdog timer

2.3.13 M-Systems DiskOnChip Socket (Optional)

M-Systems *DiskOnChip 2000* is a high performance flash disk in a standard 32-pin DIP package. This unique data storage solution offers cost effective data storage beyond that of traditional hard disks. Perfect for applications with limited space and varying capacity requirements. The *DiskOnChip 2000* is simply integrated into your CPU board and you have a bootable flash disk.

The *DiskOnChip 2000* includes M-Systems proprietary TrueFFS® (True Flash File System) technology built-in, providing complete read/write capability and hard disk emulation. TrueFFS provides hard disk compatibility at both the sector and file level. The *DiskOnChip 2000* works in all major operating systems including DOS, Windows Embedded NT/CE/2000, Linux, pSOS+, VxWorks, QNX, BE and more. It is also relatively easy to customize to work in O/S-less and non-x86 environments.

The use of TrueFFS, in conjunction with the built-in EDC/ECC, provides maximum data reliability, even under harsh operating conditions such as power failures. Advanced wear leveling ensures long flash life for maximum usage.

2.3.14 Compact Flash Interface

A Compact Flash type II connector is connected to the secondary IDE controller. The Compact Flash storage card is IDE compatible. It is an ideal replacement for standard IDE hard drives. The solid-state design offers no seek errors even under extreme shock and vibration conditions. The Compact Flash storage card is extremely small and highly suitable for rugged environments, thus providing an excellent solution for mobile applications with space limitations. It is fully compatible with all consumer applications designed for data storage PC card, PDA, and Smart Cellular Phones, allowing simple use for the end user. The Compact Flash storage card is O/S independent, thus offering an optimal solution for embedded systems operating in non-standard computing environments. The Compact Flash storage card is IDE compatible and offers various capacities.

2.3.15 NS CS9211 DSTN Companion Chip (EBC-5410D Only)

The National Semiconductor ® Geode™ CS9211 graphics companion is suitable for systems that use any GX-series processor (e.g., GX1, GXLV, GXm) along with the CS5530A I/O companion, also members of the Geode family of products.

The CS9211 converts the digital pixel stream output of the CS5530A to the digital RGB inputs used by standard single and dual-scan STN LCD display panels. Support is provided for both color and monochrome dual-scan STN (DSTN) flat panels up to 1024x768 resolution, and for color single-scan panels up to 640x480 resolution.

2.3.16 NS DS90363A LVDS Transmitter Chip (EBC-5410V Only)

The DS90C363A/DS90CF363A transmitter converts 21 bits of CMOS/TTL data into three LVDS (Low Voltage Differential Signaling) data streams. A phase-locked transmit clock is transmitted in parallel with the data streams over a fourth LVDS link. Every cycle of the transmit clock 21 bits of input data are sampled and transmitted. At a transmit clock frequency of 65 MHz, 18 bits of RGB data and 3 bits of LCD timing and control data (FPLINE, FPFRAME, DRDY) are transmitted at a rate of 455 Mbps per LVDS data channel. Using a 65 MHz clock, the data throughput is 170 Mbytes/sec. The DS90C363A transmitter can be programmed for Rising edge strobe or Falling edge strobe through a dedicated pin. The DS90CF363A is fixed as a Falling edge strobe transmitter. A Rising edge or Falling edge strobe transmitter will interoperate with a Falling edge strobe Receiver (DS90CF364) without any translation logic.

This chipset is an ideal means to solve EMI and cable size problems associated with wide, high speed TTL interfaces.

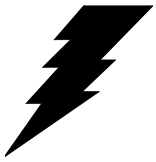
3. Hardware Configuration

3.1 Installation Procedure

1. Turn off the power supply.
2. Insert the DIMM module (be careful with the orientation).
3. Insert all external cables for hard disk, floppy, keyboard, mouse, USB etc. except for flat panel. A CRT monitor must be connected in order to change CMOS settings to support flat panel.
4. Connect power supply to the board via the PWR1.
5. Turn on the power.
6. Enter the BIOS setup by pressing the delete key during boot up. Use the "LOAD BIOS DEFAULTS" feature. The ***Integrated Peripheral Setup*** and the ***Standard CMOS Setup*** Window must be entered and configured correctly to match the particular system configuration.
7. If TFT panel display is to be utilised, make sure the panel voltage is correctly set before connecting the display cable and turning on the power.

3.2 Safety Precautions

3.2.1 Warning!



Always completely disconnect the power cord from your chassis or power cable from your board whenever you work with the hardware. Do not make connections while the power is on. Sensitive electronic components can be damaged by sudden power surges. Only experienced electronics personnel should open the PC chassis.

3.2.2 Caution!

Always ground yourself to remove any static charge before touching the board. Modern electronic devices are very sensitive to static electric charges. As a safety precaution, use a grounding wrist strap at all times. Place all electronic components in a static-dissipative surface or static-shielded bag when they are not in the chassis.

3.3 Installing DRAM (DIMMs)

3.3.1 System Memory

The reverse side of the EBC-5410 series contains a socket for 144-pin dual inline memory module (DIMM). The socket uses 3.3 V unbuffered synchronous DRAM (SDRAM). DIMM module is available in capacities of 32, 64, 128, or 256 MB. The socket can be filled in the DIMM of any size, giving your EBC-5410 series single board between 32 and 256 MB of memory.

3.3.2 Supplementary Information About DIMM

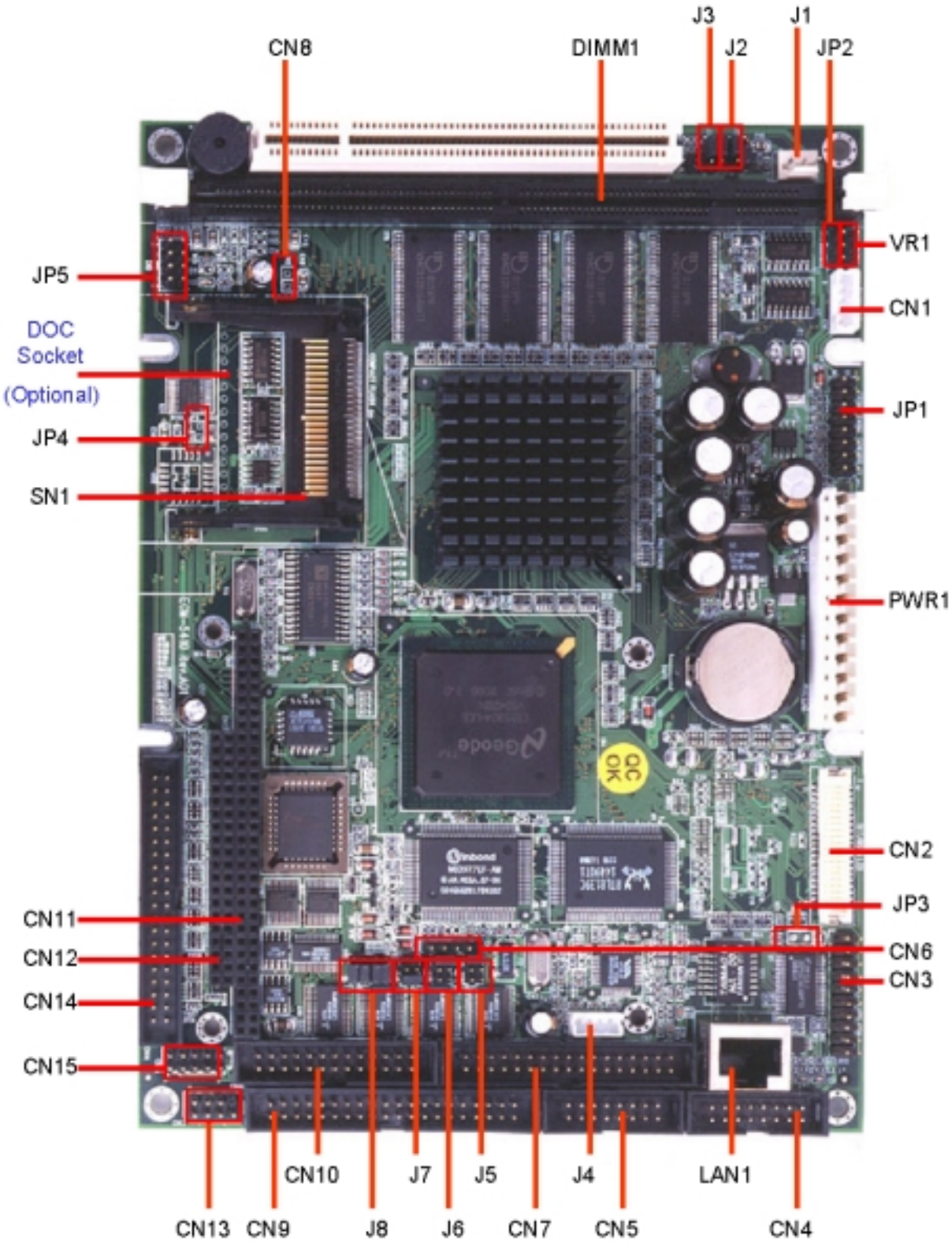
Your EBC-5410 series accepts both regular and PC-100 SDRAM DIMM Module (with or without parity). Single-sided modules are typically 64 MB; double-sided modules are usually 32 or 128 MB.

3.3.3 Memory Installation Procedures

Press the DIMM module right down into the socket, until you hear a click. This is when the two handles have automatically locked the memory module into the correct position of the DIMM socket. (See Figure below) To take away the memory module, just push both handles outward, and the memory module will be ejected by the mechanism in the socket.

3.4 Jumper & Connector

3.4.1 Jumper & Connector Layout



3.4.2 Jumper & Connector List

Connectors on the board are linked to external devices such as hard disk drives, keyboard, mouse, or floppy drives. In addition, the board has a number of jumpers that allow you to configure your system to suit your application.

The following tables list the function of each of the board's jumpers and connectors.

Jumpers		
Label	**Function**	**Note**
J2	LCD driving & backlight voltage select	3 x 2 header, pitch 2.0mm
J3	Clear CMOS / LCD clock signal select	3 x 2 header, pitch 2.0mm
J5	COM3 pin 9 signal select	3 x 2 header, pitch 2.0mm
J6	COM4 pin 9 signal select	3 x 2 header, pitch 2.0mm
J7, J8	COM2 RS-232/422/485 select	3 x 2 header, pitch 2.0mm 4 x 3 header, pitch 2.0mm (J8)
JP3	LVDS VDD voltage select	3 x 1 header, pitch 2.54mm (EBC-5410V only)
JP4	DOC memory address select (optional)	2 x 2 header, pitch 2.0mm

Connectors		
Label	**Function**	**Note**
CN1	LCD inverter connector	5 x 1 wafer, pitch 2.0mm
CN2	TFT/DSTN panel connector	HIROSE DF13-40DP-1.25V (Only EBC-5410D supports DSTN Panels)
CN3	LVDS interface connector	10 x 2 header, pitch 2.54mm (EBC-5410V only)
CN4	CRT connector	8 x 2 header, pitch 2.54mm
CN5	Audio output connector	8 x 2 header, pitch 2.54mm
CN6	IrDA connector	5 x 1 header, pitch 2.54mm
CN7	Floppy connector	17 x 2 header, pitch 2.54mm
CN8	Fan connector	
CN9	Serial port 1 / 2 / 3 / 4 connector	20 x 2 header, pitch 2.54mm
CN10	Parallel port connector	13 x 2 header, pitch 2.54mm
CN11, CN12	PC/104 connector	
CN13	Keyboard and PS/2 mouse connector	4 x 2 header, pitch 2.54mm
CN14	IDE connector	20 x 2 header, pitch 2.54mm
CN15	USB connector	5 x 2 header, pitch 2.54mm
J1	Auxiliary power connector	3 x 1 wafer, pitch 2.54mm
J4	CD-ROM audio input connector	4 x 1 wafer, pitch 2.0mm
JP1	Front panel connector	8 x 2 header, pitch 2.54mm
JP2	LCD Backlight brightness adjustment connector	3 x 1 header, pitch 2.54mm
JP5	Digital input / output connector	4 x 2 header, pitch 2.54mm
LAN1	10/100Base-Tx Ethernet 1 connector	RJ-45
PWR1	Power connector	
SN1	Compact Flash connector	
U25	M-Systems DOC socket (optional)	
VR1	STN LCD contrast adjustment connector	3 x 1 header, pitch 2.54mm (EBC-5410D only)
DIMM1	168-pin DIMM socket	

3.5 Setting Jumpers

You can configure your board to match the needs of your application by setting jumpers. A jumper is the simplest kind of electric switch.

It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To “close” a jumper you connect the pins with the clip. To “open” a jumper you remove the clip. Sometimes a jumper will have three pins, labeled 1, 2, and 3. In this case, you would connect either two pins.

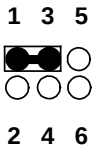
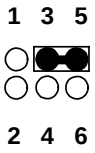
The jumper settings are schematically depicted in this manual as follows:

A pair of needle-nose pliers may be helpful when working with jumpers.

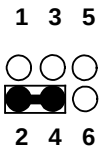
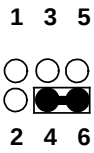
If you have any doubts about the best hardware configuration for your application, contact your local distributor or sales representative before you make any changes.

3.5.1 LCD Driving & Backlight Voltage Select (J2)

You can select the LCD connector CN2 driving (pin 5 and pin 6) and backlight (pin 1 and pin 2) voltage by setting J2. The configurations are as follows.

LCD Driving Voltage Select (J2 / Pin 1,3,5)		
	+5V	+3.3V*
J2		

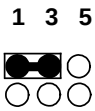
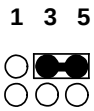
* default

LCD Backlight Voltage Select (J2 / Pin 2,4,6)		
	+5V*	+12V
J2		

* default

3.5.2 Clear CMOS (J3 / Pin 1, 3, 5)

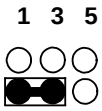
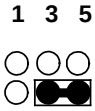
You can use J3 to clear the CMOS data if necessary. To reset the CMOS data, set J3 to 3-5 closed for just a few seconds, and then move the jumper back to 1-3 closed.

Clear CMOS (J3 / Pin 1, 3, 5)		
	Protect*	Clear CMOS
J3		

* default

3.5.3 LCD Clock Signal Select (J3 / Pin 2, 4, 6)

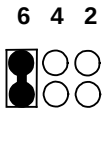
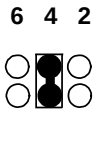
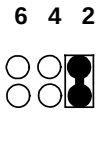
You can select the LCD control signal by setting J3. The following charts show the available option.

LCD Clock Signal Select (J3 / Pin 2, 4, 6)		
	SHFCLK*	-SHFCLK
J3		

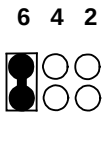
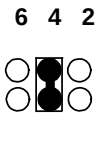
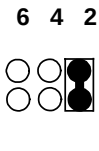
* default

3.5.4 COM3 / 4 Pin 9 Signal Select (J5 / J6)

The EBC5410 COM3 / 4 pin 9 signal can be selected as +12V, +5V, or Ring by setting J5 / J6 respectively.

COM3 Select (J5)			
	Ring*	+5V	+12V
J5			

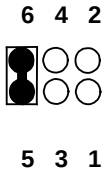
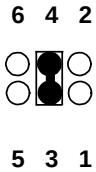
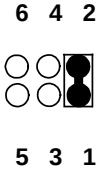
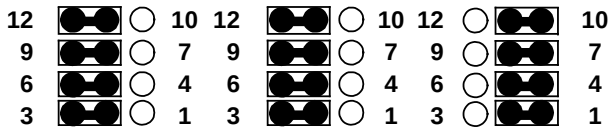
* default

COM4 Select (J6)			
	Ring*	+5V	+12V
J6			

* default

3.5.5 COM2 RS-232/422/485 Select (J7, J8)

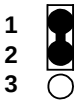
The EBC5410 COM2 serial port can be selected as RS-232, RS-422, or RS-485 by setting J7 & J8.

COM2 RS-232/422/485 Select (J7, J8)			
	RS-485	RS-422	RS-232*
J7			
J8			

* default

3.5.6 LVDS VDD Voltage Select (JP3, EBC-5410V Only)

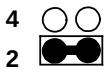
You can use JP3 to select the LVDS VDD Voltage.

LVDS VDD Voltage Select (JP3)		
	+5V or +12V	+3.3V or +5V*
JP3		

* default

3.5.7 M-Systems DiskOnChip Memory Address Select (JP4, Optional)

The M-systems DiskOnChip memory address can be selected by JP4. The choice is D0000~D1FFF, D4000~D5FFF, D8000~D9FFF, or Disabled.

M-systems DiskOnChip Memory Address Select (JP4)				
	D4000	D0000*	D8000	Disabled
JP4				

* default

3.6 Connector Definitions

3.6.1 LCD Inverter Connector (CN1)

Signal	PIN
VCC	5
VR	4
ENBKL	3
GND	2
+12V	1

Note:

For inverters with adjustable Backlight function, it is possible to control the LCD brightness through the VR signal (pin 4) controlled by **JP2**. Please see the JP2 section for detailed circuitry information.

3.6.2 TFT Panel Connector (CN2)

Signal	PIN		Signal
VDDSAFE5	2	1	VDDSAFE5
GND	4	3	GND
VDDSAFE3	6	5	VDDSAFE3
GND	8	7	Vcon
P1	10	9	P0
P3	12	11	P2
P5	14	13	P4
P7	16	15	P6
P9	18	17	P8
P11	20	19	P10
P13	22	21	P12
P15	24	23	P14
P17	26	25	P16
P19	28	27	P18
P21	30	29	P20
P23	32	31	P22
GND	34	33	GND
FLM	36	35	SHFCLK
LP	38	37	M
ENVEE	40	39	ENBKL

3.6.3 Signal Description – TFT Panel Connector (CN2)

P [23:18] P [15:10] P [7:2]	Flat panel data output for 9, 12, or 18 bit TFT flat panels. Refer to table below for configurations for various panel types. The flat panel data and control outputs are all on-board controlled for secure power-on/off sequencing
SHFCLK	Shift Clock. Pixel clock for flat panel data
LP	Latch Pulse. Flat panel equivalent of HSYNC (horizontal synchronization)
FLM	First Line Marker. Flat panel equivalent of VSYNC (vertical synchronization)
M	Multipurpose signal, function depends on panel type. May be used as AC drive control signal or as BLANK# or Display Enable signal
ENBKL	Enable backlight signal. This signal is controlled as a part of the panel power sequencing
ENVEE	Enable VEE. Signal to control the panel power-on/off sequencing. A high level may turn on the VEE (LCD bias voltage) supply to the panel
VDDSAFE5	LCD Backlight Voltage +5V* or +12V selected by J2 / Pin 2, 4, 6
VDDSAFE3	LCD Driving Voltage +5V or 3.3V* selected by J2 / Pin 1, 3, 5

* Default

3.6.4 Signal Configuration – TFT Panel Displays

Pin name	18 Bit TFT	12 Bit TFT	9 Bit TFT/ 640 x 480	9 Bit TFT/ 1024 x 768
P23	R5	R5	R5	R5 (Even)
P22	R4	R4	R4	R4 (Even)
P21	R3	R3	R3	R3 (Even)
P20	R2	R2	-	R5 (Odd)
P19	R1	-	-	R4 (Odd)
P18	R0	-	-	R3 (Odd)
P15	G5	G5	G5	G5 (Even)
P14	G4	G4	G4	G4 (Even)
P13	G3	G3	G3	G3 (Even)
P12	G2	G2	-	G5 (Odd)
P11	G1	-	-	G4 (Odd)
P10	G0	-	-	G3 (Odd)
P7	B5	B5	B5	B5 (Even)
P6	B4	B4	B4	B4 (Even)
P5	B3	B3	B3	B3 (Even)
P4	B2	B2	-	B5 (Odd)
P3	B1	-	-	B4 (Odd)
P2	B0	-	-	B3 (Odd)

Note:

The principle of attachment of TFT panels is that the bits for red, green, and blue use the most significant bits and skip the least significant bits if the display interface width of the TFT panel is insufficient.

3.6.5 DSTN Panel Connector (CN2, EBC-5410D Only)

Signal	PIN		Signal
VDDSAFE5	2	1	VDDSAFE5
GND	4	3	GND
VDDSAFE3	6	5	VDDSAFE3
GND	8	7	VCON
UD1	10	9	UD0
UD3	12	11	UD2
UD5	14	13	UD4
UD7	16	15	UD6
UD9	18	17	UD8
UD11	20	19	UD10
LD1	22	21	LD0
LD3	24	23	LD2
LD5	26	25	LD4
LD7	28	27	LD6
LD9	30	29	LD8
LD11	32	31	LD10
GND	34	33	GND
FLM	36	35	SHFCLK
LP	38	37	LDE
VCON	40	39	DISPOFF

3.6.6 Signal Description – DSTN Panel Connector (CN2)

LD[11:0], UD[11:0]	**Upper and Lower Scan Data** These outputs are the panel pixel data bus to the LCD panel. The data format is dependent on the panel type selected.
SHFCLK	**Panel Clock (Shift Clock)** This is the shift clock or pixel clock for the flat panel data. This signal is used to clock pixel data into the LCD panel. Depending on the type of panel being interfaced, this signal can also be referred to as CL2 or SHIFT.
FLM	**First Line Marker (SSTN/DSTN Panels)** This is the frame pulse for the flat panel data indicating a display frame is about to start. Depending on the type of panel being interfaced, this signal can also be referred to as FP or FRAME.
LDE	**Flat Panel Display Enable (TFT Panels)** LDE is the display enable for active-matrix TFT panels and is used to indicate the active pixel data on UD[11:0] and LD[11:0].
LP	**Latch Pulse (SSTN/DSTN Panels)** Latch Pulse is the line pulse or latch pulse for the flat panel data, indicating that a display line is about to start. Depending on the type of panel being interfaced, this signal can also be referred to as CL1 or LINE.
DISPOFF	**Disables Backlight** When this output is asserted low, it turns the backlight off.
VCON	**Controls LCD Bias Voltage Enable** When this output is asserted high, the contrast voltage is applied to the panel. This signal should be connected directly to the panel.

3.6.7 LVDS Interface Connector (CN3)

Signal	PIN		Signal
LVDS VDD	1	2	LVDS VDD
GND	3	4	GND
Tx0-	5	6	Tx0+
GND	7	8	Tx1-
Tx1+	9	10	GND
Tx2-	11	12	Tx2+
GND	13	14	TxCLK-
TxCLK+	15	16	GND
NC	17	18	NC
GND	19	20	LVDS VDD

3.6.8 CRT Connector (CN4)

Signal	PIN		Signal
NC	16	8	GND
DDCCLK	15	7	GND
VSYNC	14	6	GND
HSYNC	13	5	GND
DDCDAT	12	4	NC
NC	11	3	BLUE
GND	10	2	GREEN
VCC	9	1	RED

3.6.9 Signal Description – CRT Connector (CN4)

HSYNC	CRT horizontal synchronisation output.
VSYNC	CRT vertical synchronisation output.
DDCCLK	Display Data Channel Clock. Used as clock signal to/from monitors with DDC interface.
DDCDAT	Display Data Channel Data. Used as data signal to/from monitors with DDC interface.
RED	Analog output carrying the red colour signal to the CRT. For 75 Ω cable impedance.
GREEN	Analog output carrying the green colour signal to the CRT. For 75 Ω cable impedance.
BLUE	Analog output carrying the blue colour signal to the CRT. For 75 Ω cable impedance.

3.6.10 Audio Output Connector (CN5)

Signal	PIN		Signal
NC	16	15	GND
NC	14	13	GND
NC	12	11	AGND
Line-In R	10	9	Line-In L
NC	8	7	NC
Line-Out R	6	5	Line-Out L
AGND	4	3	AGND
Mic Bias	2	1	Mic

3.6.11 Signal Description – Audio Connector (CN5)

Mic / Mic Bias	The MIC signal is used for microphone input. This input is fed to the left microphone channel. Mic Bias provides 3.3V supplied through 3.2K Ω with capacitive decoupling to GND. This signal may be used for bias of some microphone types.
Line-In L/R	Left and right line in signals.
Line-Out L/R	Left and right line out signals. Both signals are capacitor coupled and should have GND as return.

3.6.12 IrDA Connector (CN6)

Signal	PIN
VCC	1
CIRRX	2
IRRX	3
GND	4
IRTX	5

3.6.13 Signal Configuration – IrDA Connector (CN6)

IRRX	Infrared Receiver input
IRTX	Infrared Transmitter output

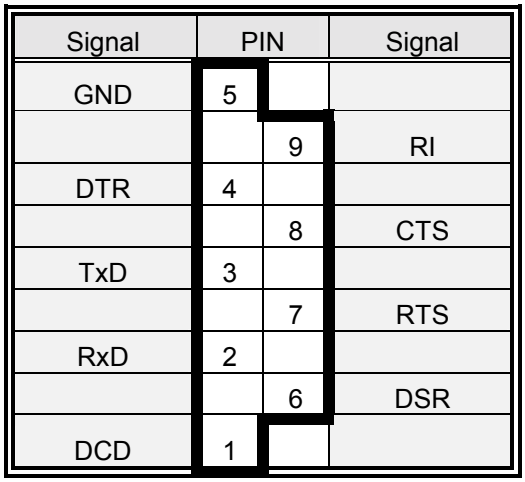
3.6.14 Fan Connector (CN8)

Signal	PIN
GND	2
VCC	1

3.6.15 Pin Header Serial Port 1 / 2 / 3 / 4 Connector in RS-232 Mode (CN9)

Signal	PIN		Signal
NC	40	39	GND
RI4/5V/12V	38	37	DTR4
CTS4	36	35	TxD4
RTS4	34	33	RxD4
DSR4	32	31	DCD4
NC	30	29	GND
RI3/5V/12V	28	27	DTR3
CTS3	26	25	TxD3
RTS3	24	23	RxD3
DSR3	22	21	DCD3
NC	20	19	GND
RI2	18	17	DTR2
CTS2	16	15	TxD2
RTS2	14	13	RxD2
DSR2	12	11	DCD2
NC	10	9	GND
RI1	8	7	DTR1
CTS1	6	5	TxD1
RTS1	4	3	RxD1
DSR1	2	1	DCD1

3.6.16 Serial Port 1 / 2 / 3 / 4 with External DB9 Connector



Signal	PIN		Signal
GND	5		
		9	RI
DTR	4		
		8	CTS
TxD	3		
		7	RTS
RxD	2		
		6	DSR
DCD	1		

3.6.17 Signal Description – Serial Port 1 / 2 / 3 / 4 Connector in RS-232 Mode (CN9)

TxD	Serial output. This signal sends serial data to the communication link. The signal is set to a marking state on hardware reset when the transmitter is empty or when loop mode operation is initiated.
RxD	Serial input. This signal receives serial data from the communication link.
DTR	Data Terminal Ready. This signal indicates to the modem or data set that the on-board UART is ready to establish a communication link.
DSR	Data Set Ready. This signal indicates that the modem or data set is ready to establish a communication link.
RTS	Request To Send. This signal indicates to the modem or data set that the on-board UART is ready to exchange data.
CTS	Clear To Send. This signal indicates that the modem or data set is ready to exchange data.
DCD	Data Carrier Detect. This signal indicates that the modem or data set has detected the data carrier.
RI	Ring Indicator. This signal indicates that the modem has received a telephone ringing signal.

3.6.18 Pin Header Serial Port 2 Connector in RS-422 Mode (CN9 / Pin 11~20)

Signal	PIN		Signal
NC	20	19	GND
NC	18	17	Rx-
NC	16	15	Tx+
NC	14	13	Rx+
NC	12	11	Tx-

3.6.19 Signal Description – Serial Port 2 in RS-422 Mode (CN9 / Pin 11~20)

Tx +/-	Serial output. This differential signal pair sends serial data to the communication link. Data is transferred from Serial Port 2 Transmit Buffer Register to the communication link, if the RTS register of the Serial Port 2 is set to LOW.
Rx +/-	Serial input. This differential signal pair receives serial data from the communication link. Received data is available in Serial Port 2 Receiver Buffer Register.

3.6.20 Pin Header Serial Port 2 Connector in RS-485 Mode (CN9 / Pin 11~20)

Signal	PIN		Signal
NC	20	19	GND
NC	18	17	NC
NC	16	15	DATA+
NC	14	13	NC
NC	12	11	DATA-

3.6.21 Signal Description – Serial Port 2 in RS-485 Mode (CN9 / Pin 11~20)

DATA +/-	This differential signal pair sends and receives serial data to the communication link. The mode of this differential signal pair is controlled through the RTS register of Serial Port 2. Set the RTS register of the Serial Port 2 to LOW for transmitting, HIGH for receiving.

Warning: Do not select a mode different from the one used by the connected peripheral, as this may damage CPU board and/or peripheral.

The transmitter drivers in the port are short circuit protected by a thermal protection circuit. The circuit disables the drivers when the die temperature reach 150 °C.

RS-422 mode is typically used in point to point communication. Data and control signal pairs should be terminated in the receiver end with a resistor matching the cable impedance (typ. 100-120 Ω). The resistors could be placed in the connector housing.

RS-485 mode is typically used in multi drop applications, where more than 2 units are communicating. The data and control signal pairs should be terminated in each end of the communication line with a resistor matching the cable impedance (typical 100-120 Ω). Stubs to substations should be avoided.

3.6.22 Parallel Port Connector (CN10)

Signal	PIN		Signal
GND	26	25	SLCT
GND	24	23	PE
GND	22	21	BUSY
GND	20	19	ACK#
GND	18	17	PD7
GND	16	15	PD6
GND	14	13	PD5
GND	12	11	PD4
GND	10	9	PD3
SLIN#	8	7	PD2
INIT#	6	5	PD1
ERR#	4	3	PD0
AFD#	2	1	STB#

3.6.23 DB25 Parallel Port Connector

Signal	PIN		Signal
STB#	1		
		14	AFD#
PD0	2		
		15	ERR#
PD1	3		
		16	INIT#
PD2	4		
		17	SLIN#
PD3	5		
		18	GND
PD4	6		
		19	GND
PD5	7		
		20	GND
PD6	8		
		21	GND
PD7	9		
		22	GND
ACK#	10		
		23	GND
BUSY	11		
		24	GND
PE#	12		
		25	GND
SLCT	13		

3.6.24 Signal Description – Parallel Port (CN10)

The following signal description covers the signal definitions, when the parallel port is operated in standard centronic mode. The parallel port controller also supports the fast EPP and ECP modes.

PD [7:0]	Parallel data bus from PC board to printer. The data lines are able to operate in PS/2 compatible bi-directional mode.
SLIN#	Output line for detection of printer selection. This pin is pulled high internally.
SLCT	An active high input on this pin indicates that the printer is selected. This pin is pulled high internally.
STB#	An active low output is used to latch the parallel data into the printer. This pin is pulled high internally.
BUSY	An active high input indicates that the printer is not ready to receive data. This pin is pulled high internally.
ACK#	An active low input on this pin indicates that the printer has received data and is ready to accept more data. This pin is pulled high internally.
INIT#	Output line for the printer initialization. This pin is pulled high internally.
AFD#	An active low output from this pin causes the printer to auto feed a line after a line is printed. This pin is pulled high internally.
ERR#	An active low input on this pin indicates that the printer has encountered an error condition. This pin is pulled high internally.
PE#	An active high input on this pin indicates that the printer has detected the end of the paper. This pin is pulled high internally.

3.6.25 PC/104 Connector (CN11, CN12)

Signal	PIN		PIN		Signal
GND	B32	A32			GND
GND	B31	A31			SA0
OSC	B30	A30			SA1
VCC	B29	A29			SA2
BALE	B28	A28			SA3
NC			C19	D19	GND
TC	B27	A27			SA4
SD15			C18	D18	GND
DACK2#	B26	A26			SA5
SD14			C17	D17	MASTER#
IRQ3	B25	A25			SA6
SD13			C16	D16	VCC
IRQ4	B24	A24			SA7
SD12			C15	D15	DRQ7
IRQ5	B23	A23			SA8
SD11			C14	D14	DACK7#
IRQ6	B22	A22			SA9
SD10			C13	D13	DRQ6
IRQ7	B21	A21			SA10
SD9			C12	D12	DACK6#
SYSCLK	B20	A20			SA11
SD8			C11	D11	DRQ5
REFRESH#	B19	A19			SA12
SMEMW#			C10	D10	DACK5#
DRQ1	B18	A18			SA13
SMEMR#			C9	D9	DRQ0
DACK1#	B17	A17			SA14
LA17			C8	D8	DACK0#
DRQ3	B16	A16			SA15
LA18			C7	D7	IRQ14
DACK3#	B15	A15			SA16
LA19			C6	D6	IRQ15
IOR#	B14	A14			SA17
LA20			C5	D5	IRQ12
IOW#	B13	A13			SA18
LA21			C4	D4	IRQ11
SMEMR#	B12	A12			SA19
LA22			C3	D3	IRQ10
SMEMW#	B11	A11			AEN
LA23			C2	D2	IOCS16#
GND	B10	A10			IOCHRDY
SBHE#			C1	D1	MEMCS16#
+ 12 V	B9	A9			SD0
GND			C0	D0	GND
OWS#	B8	A8			SD1
- 12 V	B7	A7			SD2
DRQ2	B6	A6			SD3
- 5 V	B5	A5			SD4
IRQ9	B4	A4			SD5
VCC	B3	A3			SD6
RESETDRV	B2	A2			SD7
GND	B1	A1			IOCHCHK#

3.6.26 Signal Description – PC/104 Connector (CN11, CN12)

3.6.26.1 Address

LA [23:17]	The address signals LA [23:17] define the selection of a 128KB section of memory space within the 16MB address range of the 16-bit data bus. These signals are active high. The validity of the MEMCS16# depends on these signals only. These address lines are presented to the system with tri-state drivers. The permanent master drives these lines except when an alternate master cycle occurs; in this case, the temporary master drives these lines. The LA signals are not defined for I/O accesses.
SA [19:0]	System address. Address lines for the first one Megabyte of memory. SA [9:0] used for I/O addresses. SA0 is the least significant bit
SBHE#	This signal is an active low signal, that indicates that a byte is being transferred on the upper byte (SD [15:8)) of the 16 bit bus. All bus masters will drive this line with a tri-state driver.

3.6.26.2 Data

SD [15:8]	These signals are defined for the high order byte of the 16-bit data bus. Memory or I/O transfers on this part of the bus are defined when SBHE# is active.
SD [7:0]	These signals are defined for the low order byte of the 16-bit data bus being the only bus for 8 bit PC-AT/PC104 adapter boards. Memory or I/O transfers on this part of the data bus are defined for 8-bit operations with even or odd addresses and for 16-bit operations for odd addresses only. The signals SA0 and SBHE# are used to define the data present on this bus:

SBHE#	SA0	SD15-SD8	SD7-SD0	Action
0	0	ODD	EVEN	Word transfer
0	1	ODD	ODD	Byte transfer on SD15-SD8
1	0	-	EVEN	Byte transfer on SD7-SD0
1	1	-	ODD	Byte transfer on SD7-SD0

3.6.26.3 Commands

BALE	This is an active high signal used to latch valid addresses from the current bus master on the falling edge of BALE. During DMA, refresh and alternate master cycles, BALE is forced high for the duration of the transfer. BALE is driven by the permanent master with a totem-pole driver.
IOR#	This is an active low signal driven by the current master to indicate an I/O read operation. I/O mapped devices using this strobe for selection should decode addresses SA [15:0] and AEN. Additionally, DMA devices will use IOR# in conjunction with $DACK_n$# to decode a DMA transfer from the I/O device. The current bus master will drive this line with a tri-state driver.
IOW#	This is an active low signal driven by the current master to indicate an I/O write operation. I/O mapped devices using this strobe for selection should decode addresses SA [15:0] and AEN. Additionally, DMA devices will use IOR# in conjunction with $DACK_n$# to decode a DMA transfer from the I/O device. The current bus master will drive this line with a tri-state driver.
SMEMR#	This is an active low signal driven by the permanent master to indicate a memory read operation in the first 1MB of system memory. Memory mapped devices using this strobe should decode addresses SA [19:0] only. If an alternate master drives MEMR#, the permanent master will drive SMEMR# delayed by internal logic. The permanent master ties this line to VCC through a pull-up resistor to ensure that it is inactive during the exchange of bus masters.
SMEMW#	This is an active low signal driven by the permanent master to indicate a memory write operation in the first 1MB of system memory. Memory mapped devices using this strobe should decode addresses SA [19:0] only. If an alternate master drives MEMR#, the permanent master will drive SMEMR# delayed by internal logic. The permanent master ties this line to VCC through a pull-up resistor to ensure that it is inactive during the exchange of bus masters.
MEMR#	This is an active low signal driven by the current master to indicate a memory read operation. Memory mapped devices using this strobe should decode addresses LA [23:17] and SA [19:0]. All bus masters will drive this line with a tri-state driver. The permanent master ties this line to VCC through a pull-up resistor to ensure that it is inactive during the exchange of bus masters.
MEMW#	This is an active low signal driven by the current master to indicate a memory write operation. Memory mapped devices using this strobe should decode addresses LA [23:17] and SA [19:0]. All bus masters will drive this line with a tri-state driver. The permanent master ties this line to VCC through a pull-up resistor to ensure that it is inactive during the exchange of bus masters.

3.6.26.4 Transfer Response

IOCS16#	This is an active low signal driven by an I/O-mapped PC-AT/PC104 adapter indicating that the I/O device located at the address is a 16-bit device. This open collector signal is driven, based on SA [15:0] only (not IOR# and IOW#) when AEN is not asserted.
MEMCS16#	This is an active low signal driven by a memory mapped PC-AT/PC104 adapter indicating that the memory device located at the address is a 16-bit device. This open collector signal is driven, based on LA [23:17] only.
0WS#	This signal is an active low open-collector signal asserted by a 16-bit memory mapped device that may cause an early termination of the current transfer. It should be gated with MEMR# or MEMW# and is not valid during DMA transfers. IOCHRDY precedes 0WS#.
IOCHRDY	This is an active high signal driven inactive by the target of either a memory or an I/O operation to extend the current cycle. This open collector signal is driven based on the system address and the appropriate control strobe. IOCHRDY precedes 0WS#.
IOCHCK#	This is an active low signal driven active by a PC-AT/PC104 adapter detecting a fatal error during bus operation. When this open collector signal is driven low it will typically cause a non-maskable interrupt.

3.6.26.5 Controls

SYSCLK	This clock signal may vary in frequency from 2.5 MHz to 25.0 MHz depending on the setup made in the BIOS. Frequencies above 16 MHz are not recommended. The standard states 6 MHz to 8.33 MHz, but most new adapters are able to handle higher frequencies. The PC-AT/PC104 bus timing is based on this clock signal.
OSC	This is a clock signal with a 14.31818 MHz ± 50 ppm frequency and a 50 ± 5% duty cycle. The signal is driven by the permanent master.
RESETDRV	This active high signal indicates that the adapter should be brought to an initial reset condition. This signal will be asserted by the permanent master on the bus for at least 100 ms at power-up or watchdog time-out to ensure that adapters in the system are properly reset. When active, all adapters should turn off or tri-state all drivers connected to the bus.

3.6.26.6 Interrupts

IRQ [3:7], IRQ [9:12], IRQ [14:15]	These signals are active high signals, which indicate the presence of an interrupting PC-AT/PC104 bus adapter. Due to the use of pull-ups, unused interrupt inputs must be masked.

3.6.26.7 Bus Arbitration

DRQ [0:3], DRQ [5:7]	These signals are active high signals driven by a DMA bus adapter to indicate a request for a DMA bus operation. DRQ [0:3] request 8 bit DMA operations, while DRQ [5:7] request 16 bit operations. All bus DMA adapters will drive these lines with a tri-state driver. The permanent master monitors these signals to determine which of the DMA devices, if any, are requesting the bus.
DACK [0:3]#, DACK [5:7]#	These signals are active low signals driven by the permanent master to indicate that a DMA operation can begin. They are continuously driven by a totem pole driver for DMA channels attached.
AEN	This signal is an active high totem pole signal driven by the permanent master to indicate that the address lines are driven by the DMA controller. The assertion of AEN disables response to I/O port addresses when I/O command strobes are asserted. AEN being asserted, only the device with active $DACK_n$# should respond.
REFRESH#	This is an active low signal driven by the current master to indicate a memory refresh operation. The current master will drive this line with a tri-state driver.
TC	This active high signal is asserted during a read or write command indicating that the DMA controller has reached a terminal count for the current transfer. $DACK_n$# must be presented by the bus adapter to validate the TC signal.
MASTER#	This signal is not supported by the chipset.

3.6.27 Keyboard and PS/2 Mouse Connector (CN13)

Signal	PIN		Signal
		4	NC
MCLK	7	3	MDAT
VCC	6	2	GND
KCLK	5	1	KDAT

3.6.28 Signal Description – Keyboard and PS/2 Mouse Connector (CN13)

KCLK	Bi-directional clock signal used to strobe data/commands from/to the PC-AT keyboard.
KDAT	Bi-directional serial data line used to transfer data from or commands to the PC-AT keyboard.
MCLK	Bi-directional clock signal used to strobe data/commands from/to the PS/2 mouse.
MDAT	Bi-directional serial data line used to transfer data from or commands to the PS/2 mouse.

3.6.29 IDE Device Connector (CN14)

Signal	PIN		Signal
GND	40	39	PDDACT#
PDCS3#	38	37	PDCS1#
PDA2	36	35	PDA0
NC	34	33	PDA1
NC	32	31	IRQ14
GND	30	29	PDDACK#
GND	28	27	PDRDY
GND	26	25	PDIOR#
GND	24	23	PDIOW#
GND	22	21	PDDRQ
NC	20	19	GND
PDD15	18	17	PDD0
PDD14	16	15	PDD1
PDD13	14	13	PDD2
PDD12	12	11	PDD3
PDD11	10	9	PDD4
PDD10	8	7	PDD5
PDD9	6	5	PDD6
PDD8	4	3	PDD7
GND	2	1	RESET#

3.6.30 Signal Description – IDE Device Connector (CN14)

PDA [2:0]	Primary Disk Address. PDA [2:0] are used to indicate which byte in either the ATA command block or control block is being accessed.
PDCS1#	Primary Master Chip Select. This signal corresponds to CS1FX# on the primary IDE connector.
PDCS3#	Primary Slave Chip Select. This signal corresponds to CS3FX# on the primary IDE connector.
PDD [15:0]	Primary Disk Data.
PDIOR#	EIDE Mode: Primary Device I/O Read. Device read strobe. UltraDMA Mode: Primary Host DMA Ready. Primary channel input flow control. The host may assert HDMARDY to pause input transfers Primary Host Strobe. Output data strobe (both edges). The host may stop HSTROBE to pause output data transfers
PDIOW#	EIDE Mode: Primary Device I/O Write. Device write strobe. UltraDMA Mode: Primary Stop. Stop transfer: Asserted by the host prior to initiation of an UltraDMA burst; negated by the host before data is transferred in an UltraDMA burst. Assertion of STOP by the host during or after data transfer in UltraDMA mode signals the termination of the burst.
PDRDY#	EIDE Mode: Primary I/O Channel Ready. Device ready indicator. UltraDMA Mode: Primary Device DMA Ready. Output flow control. The device may assert DDMARDY to pause output transfers. Primary Device Strobe. Input data strobe (both edges). The device may stop DSTROBE to pause input data transfers.
RESET#	IDE Reset. This signal resets all the devices that are attached to the IDE interface.
IRQ14	Interrupt line from IDE device. Connected directly to PC-AT bus.
PDDRQ	Primary Device DMA Request. Primary channel DMA request.
PDDACK#	Primary Device DMA Acknowledge. Primary channel DMA acknowledge.
PDDACT#	Signal from IDE device indicating IDE device activity. The signal level depends on the IDE device type, normally active low.

3.6.31 USB Connector (CN15)

Signal	PIN CH2	PIN CH1	Signal
VCC2	10	9	GND
D2-	8	7	GND
D2+	6	5	D1+
GND	4	3	D1-
GND	2	1	VCC1

3.6.32 Signal Description – USB Connector (CN15)

D1+ / D1-	Differential bi-directional data signal for USB channel 0. Clock is transmitted along with the data using NRZI encoding. The signalling bit rate is up to 12 Mbs.
D2+ / D2-	Differential bi-directional data signal for USB channel 1. Clock is transmitted along with the data using NRZI encoding. The signalling bit rate is up to 12 Mbs.
VCC	5 V DC supply for external devices. Maximum load according to USB standard.

3.6.33 Auxiliary Power Connector (J1)

Signal	PIN
VCCSB	3
VCC	2
PSON#	1

Note:

Set J1 to 2-3 closed. If AT power supply is to be used.

3.6.34 CD-ROM Audio Input Connector (J4)

Signal	PIN
CD_R	4
CD_GND	3
CD_L	2
CD_GND	1

3.6.35 Signal Configuration – CD-ROM Input Connector (J4)

CD L/R	Left and right CD audio input lines.
CD_GND	GND for left and right CD. This GND level is not connected to the board GND.

3.6.36 Front Panel Connector (JP1)

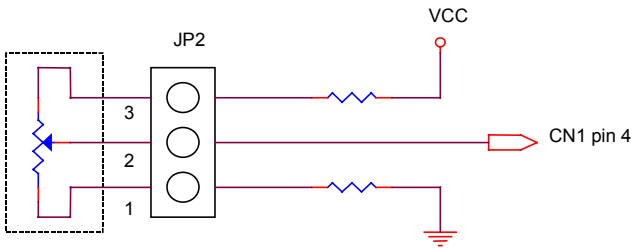
Signal	PIN		Signal
NC	16	15	NC
VCC	14	13	HDD LED
VCC	12	11	Suspend LED
GND	10	9	Reset in
GND	8	7	Suspend SW
GND	6	5	Power Button
VCC3SB	4	3	LED Link
VCC3SB	2	1	LED Tx

3.6.37 Signal Description – Front Panel Connector (JP1)

HDD LED	IDE device activity signal
Power Button	Power Button
Reset in	System Reset
SPK	External Speaker
VCC3SB	3.3V Standby Power
Suspend LED	Suspend Mode LED. When suspend mode is activated, the Suspend LED starts to blink. The Suspend LED remains on when no activity is present, the activity LED is off.
Suspend SW	Suspend Switch.
LED Link	Link Integrity LED. The Link Integrity LED pin indicates link integrity. If the link is valid in either 10 or 100 Mbps, the LED is on; if link is invalid, the LED is off.
LED Tx	Activity LED. The Activity LED pin indicates either transmit or receive activity. When activity is present, the activity LED is on; when no activity is present, the activity LED is off.

3.6.38 LCD Backlight Brightness Adjustment Connector (JP2)

Signal	PIN
GND	1
VBR	2
VCC	3



Variation Resistor (Recommended: 4.7KΩ, >1/16W)

3.6.39 Digital Input / Output Connector (JP5)

Signal	PIN		Signal
DI0	2	1	DO0
DI1	4	3	DO1
DI2	6	5	DO2
DI3	8	7	DO3

3.6.40 Digital Input / Output Programming (JP5)

The EBC-5410 series uses digital I/O to customize its configuration to your control needs. For example, you may configure the digital I/O to control the opening and closing of the cash drawer or to sense the warning signal from a tripped UPS. The following is a detailed description of how the digital I/O is controlled via software programming:

Digital Inputs	**Address**	**Bit**
DI1	281	1
DI2	281	2
DI3	281	3
DI4	281	4
Digital Outputs	**Address**	**Bit**
DO1	280	1
DO2	280	2
DO3	280	3
DO4	280	4

3.6.41 10/100 BASE-Tx Ethernet Connector (LAN1)

Signal	PIN
NC	8
NC	7
RXD-	6
NC	5
NC	4
RXD+	3
TXD-	2
TXD+	1

3.6.42 Signal Description – 10/100Base-Tx Ethernet Connector (LAN1)

TXD+ / TXD-	Ethernet 10/100Base-Tx differential transmitter outputs.
RXD+ / RXD-	Ethernet 10/100Base-Tx differential receiver inputs.

3.6.43 Power Connector 1 (PWR1)

Signal	PIN
NC	1
VCC	2
+12V	3
-12V	4
GND	5
GND	6
GND	7
GND	8
-5V	9
VCC	10
VCC	11
VCC	12

3.6.44 STN LCD Contrast Adjustment Connector (VR1)

Signal	PIN
GND	1
Vcon	2
VCC3	3

4. AWARD BIOS Setup

4.1 Starting Setup

The Award BIOS is immediately activated when you first power on the computer. The BIOS reads the system information contained in the CMOS and begins the process of checking out the system and configuring it. When it finishes, the BIOS will seek an operating system on one of the disks and then launch and turn control over to the operating system.

By pressing <Del> immediately after switching the system on, or

By pressing the <Del> key when the following message appears briefly at the bottom of the screen during the POST (Power On Self Test).

```
Press DEL to enter SETUP
```

If the message disappears before you respond and you still wish to enter "Setup", restart the system to try again by turning it OFF then ON or pressing the "RESET" button on the system case. You may also restart by simultaneously pressing <Ctrl>, <Alt>, and <Delete> keys. If you do not press the keys at the correct time and the system does not boot, an error message will be displayed and you will again be asked to.

```
Press F1 To Continue, DEL to enter SETUP
```

4.2 Using Setup

In general, you use the arrow keys to highlight items, press <Enter> to select, use the PageUp and PageDown keys to change entries, press <F1> for help and press <Esc> to quit. The following table provides more detail about how to navigate in the Setup program using the keyboard.

Up arrow	Move to previous item
Down arrow	Move to next item
Left arrow	Move to the item in the left hand
Right arrow	Move to the item in the right hand
Esc key	Main Menu -- Quit and not save changes into CMOS Status Page Setup Menu and Option Page Setup Menu -- Exit current page and return to Main Menu
PgUp key	Increase the numeric value or make changes
PgDn key	Decrease the numeric value or make changes
+ key	Increase the numeric value or make changes
- key	Decrease the numeric value or make changes
F1 key	General help, only for Status Page Setup Menu and Option Page Setup Menu
(Shift) F2 key	Change color from total 16 colors. F2 to select color forward, (Shift) F2 to select color backward
F3 key	Calendar, only for Status Page Setup Menu
F4 key	Reserved
F5 key	Restore the previous CMOS value from CMOS, only for Option Page Setup Menu
F6 key	Load the default CMOS value from BIOS default table, only for Option Page Setup Menu
F7 key	Load the default
F8 key	Reserved
F9 key	Reserved
F10 key	Save all the CMOS changes, only for Main Menu

4.3 Getting Help

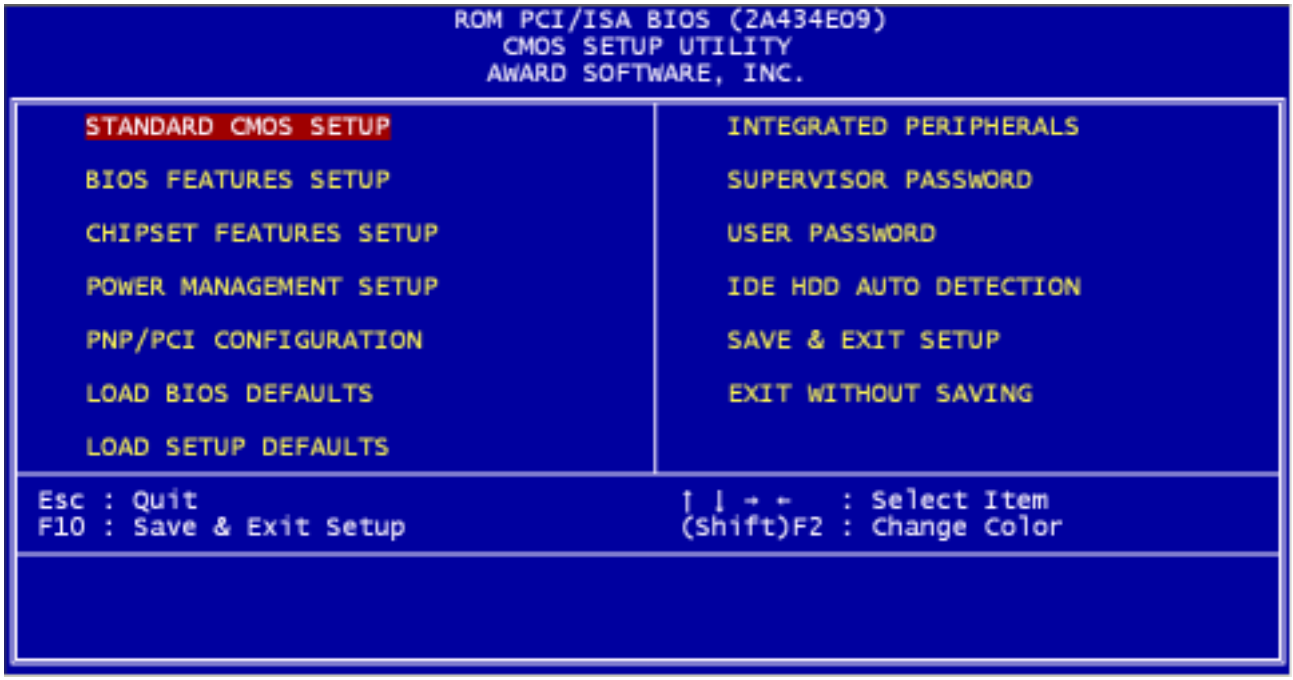
Press F1 to pop up a small help window that describes the appropriate keys to use and the possible selections for the highlighted item. To exit the Help Window press <Esc> or the F1 key again.

4.4 In Case of Problems

If, after making and saving system changes with Setup, you discover that your computer no longer is able to boot, the Award BIOS supports an override to the CMOS settings, which resets your system to its defaults.

4.5 Main Menu

Once you enter the Award BIOS CMOS Setup Utility, the Main Menu will appear on the screen. The Main Menu allows you to select from several Setup functions and two exit choices. Use the arrow keys to select among the items and press <Enter> to accept and enter the sub-menu.



4.5.1 Setup Items

The main menu includes the following main Setup categories. Recall that some systems may not include all entries.

4.5.1.1 Standard CMOS Setup

This Setup page includes all the items in a standard, AT-compatible BIOS.

4.5.1.2 BIOS Features Setup

This Setup page includes all the items of Award special enhanced features.

4.5.1.3 Chipset Features Setup

This Setup page includes all the items of chipset special features.

4.5.1.4 Power Management Setup

This entry only appears if your system supports Power Management, “Green PC”, standards.

4.5.1.5 PNP / PCI Configuration Setup

This entry appears if your system supports PNP / PCI.

4.5.1.6 Load BIOS Defaults

The BIOS defaults have been set by BCM and represent settings, which provide the minimum requirements for your system to operate.

4.5.1.7 Load Setup Defaults

The chipset defaults are settings, which provide for maximum system performance. While Award has designed the custom BIOS to maximize performance, the manufacturer has the right to change these defaults to meet their needs.

4.5.1.8 Integrated Peripherals

This section page includes all the items of IDE hard drive and Programmed Input / Output features.

4.5.1.9 Super / User Password Setting

Change, set, or disable password. It allows you to limit access to the system and Setup, or just to Setup.

4.5.1.10 IDE HDD Auto Detection

Automatically detect and configure hard disk parameters. The Award BIOS includes this ability in the event you are uncertain of your hard disk’s parameters.

4.5.1.11 Save & Exit Setup

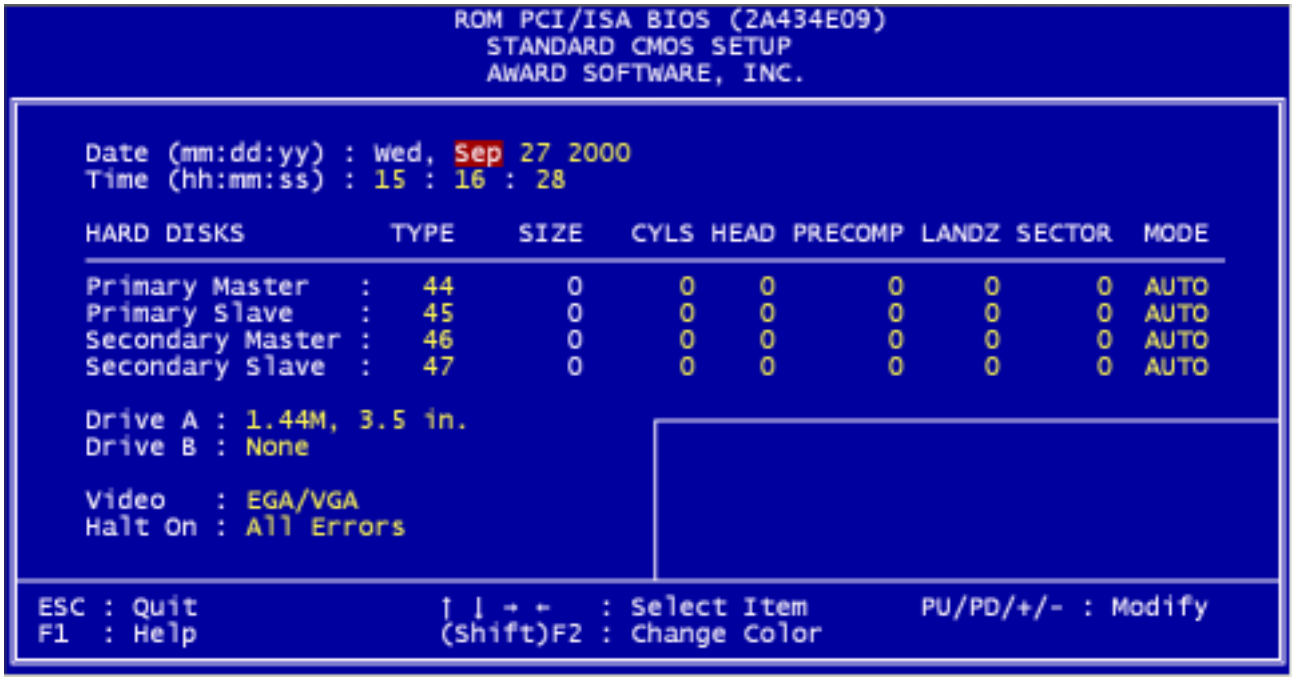
Save CMOS value changes to CMOS and exit Setup.

4.5.1.12 Exit Without Save

Abandon all CMOS value changes and exit Setup.

4.5.2 Standard CMOS Setup

The items in Standard CMOS Setup Menu are divided into 10 categories. Each category includes no, one or more than one Setup items. Use the arrow keys to highlight the item and then use the <PgUp> or <PgDn> keys to select the value you want in each item.


ROM PCI/ISA BIOS (2A434E09)
STANDARD CMOS SETUP
AWARD SOFTWARE, INC.
Date (mm:dd:yy) : Wed, Sep 27 2000
Time (hh:mm:ss) : 15 : 16 : 28
HARD DISKS TYPE SIZE CYLS HEAD PRECOMP LANDZ SECTOR MODE
Primary Master : 44 0 0 0 0 0 0 AUTO
Primary Slave : 45 0 0 0 0 0 0 AUTO
Secondary Master : 46 0 0 0 0 0 0 AUTO
Secondary Slave : 47 0 0 0 0 0 0 AUTO
Drive A : 1.44M, 3.5 in.
Drive B : None
Video : EGA/VGA
Halt On : All Errors
ESC : Quit
F1 : Help
↑ ↓ → ← : Select Item
(Shift)F2 : Change Color
PU/PD/+/- : Modify

4.5.2.1 Date

The date format is <day>, <date> <month> <year>. Press <F3> to show the calendar.

day	The day, from Sun to Sat, determined by the BIOS and is display-only
date	The date, from 1 to 31 (or the maximum allowed in the month)
month	The month, Jan through Dec.
year	The year, from 1900 through 2099

4.5.2.2 Time

The time format is <hour> <minute> <second>. The time is calculated based on the 24-hour military-time clock. For example, 1 p.m. is 13:00:00.

4.5.2.3 Daylight Saving

The category adds one hour to the clock when daylight-saving time begins. It also subtracts one hour when standard time returns.

Enabled	Enable daylight-saving
Disabled	Disable daylight-saving

4.5.2.4 Primary Master/Primary Slave/Secondary Master/Secondary Slave

The categories identify the types of 2 channels that have been installed in the computer. There are 45 predefined types and 4 users definable types are for Enhanced IDE BIOS. Type 1 to Type 45 are predefined. Type user is user-definable.

Press PgUp or PgDn to select a numbered hard disk type or type the number and press <Enter>. Note that the specifications of your drive must match with the drive table. The hard disk will not work properly if you enter improper information for this category. If your hard disk drive type is not matched or listed, you can use Type "User" to define your own drive type manually.

If you select Type "User", you will need to know the information listed below. Enter the information directly from the keyboard and press <Enter>. This information should be included in the documentation from your hard disk vendor or the system manufacturer.

If the controller of HDD interface is ESDI, the selection shall be "Type 1".

If the controller of HDD interface is SCSI, the selection shall be "None".

If you select Type "Auto", BIOS will Auto-Detect the HDD & CD-ROM Drive at the POST stage and showing the IDE for HDD & CD-ROM Drive.

TYPE	drive type
CYLS.	number of cylinders
HEADS	number of heads
PRECOMP	write precomp
LANDZONE	landing zone
SECTORS	number of sectors
MODE	mode type

If a hard disk has not been installed select NONE and press <Enter>.

4.5.2.5 Drive A Type / Drive B Type

The category identifies the types of floppy disk drive A or drive B that have been installed in the computer.

None	No floppy drive installed
360K, 5.25 in	5-1/4 inch PC-type standard drive; 360 kilobyte capacity
1.2M, 5.25 in	5-1/4 inch AT-type high-density drive; 1.2 megabyte capacity
720K, 3.5 in	3-1/2 inch double-sided drive; 720 kilobyte capacity
1.44M, 3.5 in	3-1/2 inch double-sided drive; 1.44 megabyte capacity
2.88M, 3.5 in	3-1/2 inch double-sided drive; 2.88 megabyte capacity

4.5.2.6 Video

The category selects the type of video adapter used for the primary system monitor. Although secondary monitors are supported, you do not have to select the type in Setup.

EGA/VGA	Enhanced Graphics Adapter/Video Graphics Array. For EGA, VGA, SEGA, SVGA or PGA monitor adapters.
CGA 40	Color Graphics Adapter, power up in 40 column mode
CGA 80	Color Graphics Adapter, power up in 80 column mode
MONO	Monochrome adapter, includes high resolution monochrome adapters

4.5.2.7 Halt On

The category determines whether the computer will stop if an error is detected during power up.

No errors	The system boot will not be stopped for any error that may be detected.
All errors	Whenever the BIOS detect a non-fatal error the system will be stopped and you will be prompted.
All, But Keyboard	The system boot will not stop for a keyboard error; it will stop for all other errors.
All, But Diskette	The system boot will not stop for a disk error; it will stop for all other errors.
All, But Disk/Key	The system boot will not stop for a keyboard or disk error; it will stop for all other errors.

4.5.2.8 Memory

The category is display-only which is determined by POST (Power On Self Test) of the BIOS.

4.5.2.9 Base Memory

The POST will determine the amount of base (or conventional) memory installed in the system. The value of the base memory is typically 512K for systems with 512K memory installed on the SBC, or 640K for systems with 640K or more memory installed on the SBC.

4.5.2.10 Extended Memory

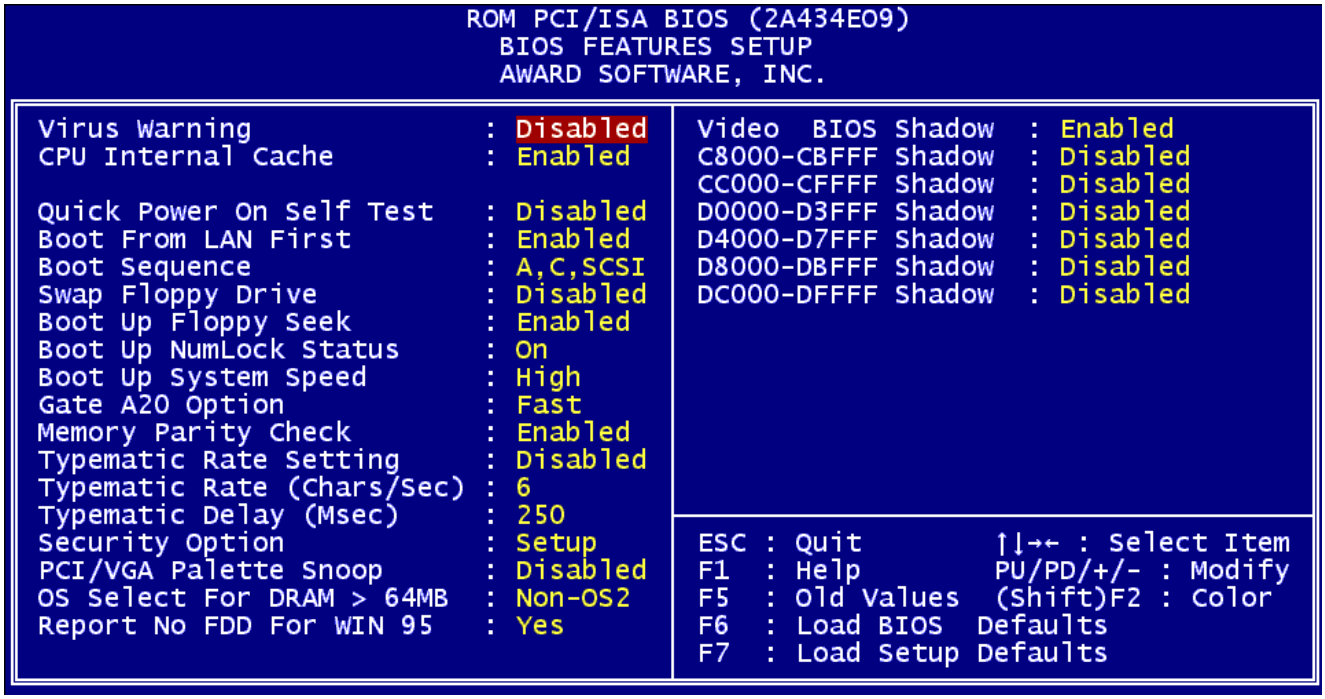
The BIOS determines how much extended memory is present during the POST. This is the amount of memory located above 1MB in the CPU's memory address map.

4.5.2.11 Other Memory

This refers to the memory located in the 640K to 1024K-address space. This is memory that can be used for different applications. DOS uses this area to load device drivers in an effort to keep as much base memory free for application programs. The BIOS is the most frequent user of this RAM area since this is where it shadows RAM.

4.5.3 BIOS Features Setup

This section allows you to configure your system for basic operation. You have the opportunity to select the system's default speed, boot-up sequence, keyboard operation, shadowing and security.


ROM PCI/ISA BIOS (2A434EO9)
BIOS FEATURES SETUP
AWARD SOFTWARE, INC.
Virus Warning : Disabled
CPU Internal Cache : Enabled
Quick Power On Self Test : Disabled
Boot From LAN First : Enabled
Boot Sequence : A,C,SCSI
Swap Floppy Drive : Disabled
Boot Up Floppy Seek : Enabled
Boot Up NumLock Status : On
Boot Up System Speed : High
Gate A20 Option : Fast
Memory Parity Check : Enabled
Typematic Rate Setting : Disabled
Typematic Rate (Chars/Sec) : 6
Typematic Delay (Msec) : 250
Security Option : Setup
PCI/VGA Palette Snoop : Disabled
OS Select For DRAM > 64MB : Non-OS2
Report No FDD For WIN 95 : Yes
Video BIOS Shadow : Enabled
C8000-CBFFF Shadow : Disabled
CC000-CFFFF Shadow : Disabled
D0000-D3FFF Shadow : Disabled
D4000-D7FFF Shadow : Disabled
D8000-DBFFF Shadow : Disabled
DC000-DFFFF Shadow : Disabled
ESC : Quit ↑↓→← : Select Item
F1 : Help PU/PD/+/- : Modify
F5 : Old Values (Shift)F2 : Color
F6 : Load BIOS Defaults
F7 : Load Setup Defaults

4.5.3.1 Virus Warning

When this item is enabled, the Award BIOS will monitor the boot sector and partition table of the hard disk drive for any attempt at modification. If an attempt is made, the BIOS will halt the system and the following error message will appear. Afterwards, if necessary, you will be able to run an anti-virus program to locate and remove the problem before any damage is done.

! WARNING!

Disk boot sector is to be modified

Type "Y" to accept write or "N" to abort write

Award Software, Inc.

4.5.3.2 CPU Internal Cache

This category speeds up memory access. However, it depends on CPU/chipset design. The default value is en able.

Enabled	Enable cache
Disabled	Disable cache

4.5.3.3 Quick Power On Self Test

This category speeds up Power On Self Test (POST) after you power up the computer. If it is set to Enable, BIOS will shorten or skip some check items during POST.

Enabled	Enable quick POST
Disabled	Normal POST

4.5.3.4 Boot Sequence

This category determines which drive to search first for the disk operating system (i.e., DOS). Default value is A, C.

C, A	System will first search for hard disk drive then floppy disk drive.
A, C	System will first search for floppy disk drive then hard disk drive.
CDROM, C, A	System will first search for CDROM drive, then hard disk drive and the next is floppy disk drive.
C, CDROM, A	System will first search for hard disk drive, then CDROM drive, and the next is floppy disk drive.

4.5.3.5 Swap Floppy Drive

This item allows you to determine whether enable the swap floppy drive or not.

The choice: Enabled/Disabled.

4.5.3.6 Boot Up Floppy Seek

During POST, BIOS will determine if the floppy disk drive installed is 40 or 80 tracks. 360K type is 40 tracks while 760K, 1.2M and 1.44M are all 80 tracks.

Enabled	BIOS searches for floppy disk drive to determine if it is 40 or 80 tracks. Note that BIOS cannot tell from 720K, 1.2M or 1.44M drive type as they are all 80 tracks.
Disabled	BIOS will not search for the type of floppy disk drive by track number. Note that there will not be any warning message if the drive installed is 360K.

4.5.3.7 Boot Up NumLock Status

This allows you to determine the default state of the numeric keypad. By default, the system boots up with NumLock on.

On	Keypad is number keys
Off	Keypad is arrow keys

4.5.3.8 Boot Up System Speed

Selects the default system speed -- the normal operating speed at power up.

High	Set the speed to high
Low	Set the speed to low

4.5.3.9 Gate A20 Option

This entry allows you to select how the gate A20 is handled. The gate A20 is a device used to address memory above 1 Mbytes. Initially, the gate A20 was handled via a pin on the keyboard. Today, while keyboards still provide this support, it is more common, and much faster, for the system chipset to provide support for gate A20.

Normal	Keyboard
Fast	Chipset

4.5.3.10 Typematic Rate Setting

This determines if the typematic rate is to be used. When disabled, continually holding down a key on your keyboard will generate only one instance. In other words, the BIOS will only report that the key is down. When the typematic rate is enabled, the BIOS will report as before, but it will then wait a moment, and, if the key is still down, it will begin the report that the key has been depressed repeatedly. For example, you would use such a feature to accelerate cursor movements with the arrow keys.

Enabled	Enable typematic rate
Disabled	Disable typematic rate

4.5.3.11 Typematic Rate (Chars/Sec)

When the typematic rate is enabled, this selection allows you select the rate at which the keys are accelerated.

6	6 characters per second
8	8 characters per second
10	10 characters per second
12	12 characters per second
15	15 characters per second
20	20 characters per second
24	24 characters per second
30	30 characters per second

4.5.3.12 Typematic Delay (Msec)

When the typematic rate is enabled, this selection allows you to select the delay between when the key was first depressed and when the acceleration begins.

250	250 msec
500	500 msec
750	750 msec
1000	1000 msec

4.5.3.13 Security Option

This category allows you to limit access to the system and Setup, or just to Setup.

System	The system will not boot and access to Setup will be denied if the correct password is not entered at the prompt.
Setup	The system will boot, but access to Setup will be denied if the correct password is not entered at the prompt.

Note: To disable security, select PASSWORD SETTING at Main Menu and then you will be asked to enter password. Do not type anything and just press <Enter>, it will disable security. Once the security is disabled, the system will boot and you can enter Setup freely.

4.5.3.14 PCI / VGA Palette Snoop

It determines whether the MPEG ISA/VESA VGA Cards can work with PCI/VGA or not.

Enabled	When PCI/VGA working with MPEG ISA/VESA VGA Card.
Disabled	When PCI/VGA not working with MPEG ISA/VESA VGA Card.

4.5.3.15 OS Select for DRAM > 64

This item allows you to access the memory that over 64MB in OS/2.

The choice: Non-OS2, OS2.

4.5.3.16 Report No FDD for WIN95

4.5.3.17 Video BIOS Shadow

Determines whether video BIOS will be copied to RAM. However, it is optional depending on chipset design. Video Shadow will increase the video speed.

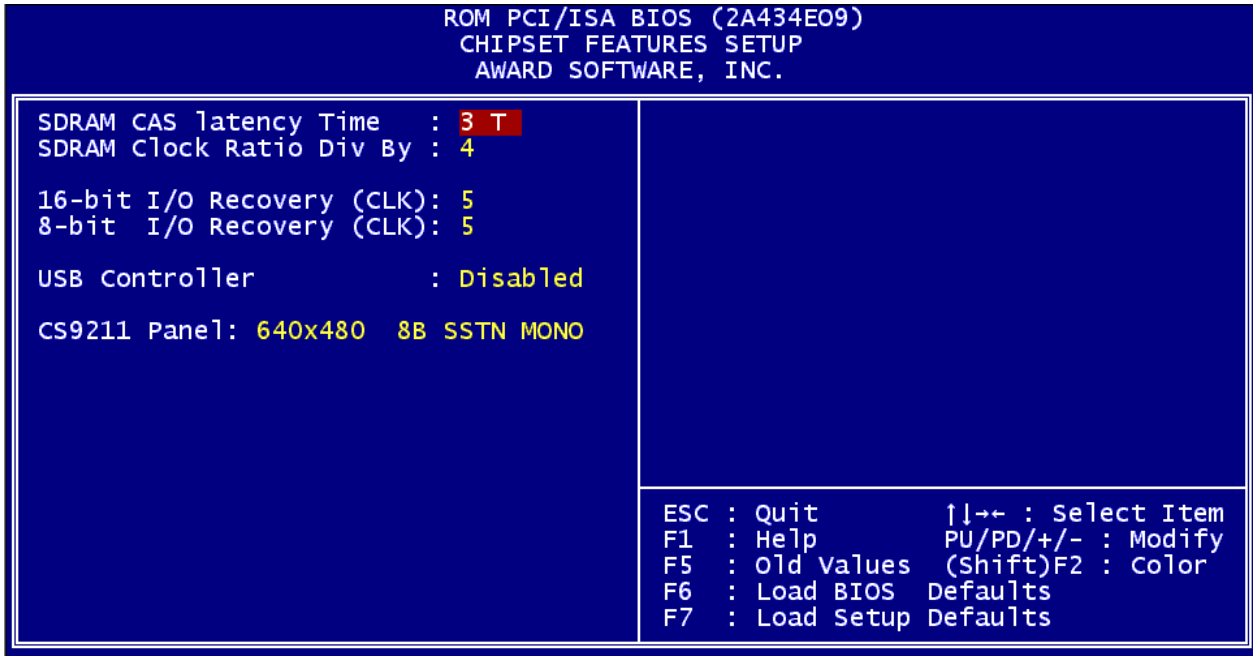
Enabled	Video shadow is enabled
Disabled	Video shadow is disabled

4.5.3.18 C8000 – CBFFF Shadow/DC000 – DFFFF Shadow

These categories determine whether option ROMs will be copied to RAM. An example of such option ROM would be support of on-board SCSI.

Enabled	Optional shadow is enabled
Disabled	Optional shadow is disabled

4.5.4 Chipset Features Setup


ROM PCI/ISA BIOS (2A434EO9)
CHIPSET FEATURES SETUP
AWARD SOFTWARE, INC.
SDRAM CAS latency Time : 3 T
SDRAM Clock Ratio Div By : 4
16-bit I/O Recovery (CLK): 5
8-bit I/O Recovery (CLK): 5
USB Controller : Disabled
CS9211 Panel: 640x480 8B SSTN MONO
ESC : Quit ↑↓→← : Select Item
F1 : Help PU/PD/+/- : Modify
F5 : Old Values (Shift)F2 : Color
F6 : Load BIOS Defaults
F7 : Load Setup Defaults

CHIPSET OPTIONS. The parameters in this screen are for system designers, service personnel, and technically competent users only. Do not reset these values unless you understand the consequences of your changes.

4.5.4.1 SDRAM CAS Latency Time

When synchronous DRAM is installed, the number of clock cycles of CAS latency depends on the DRAM timing. Do not reset this field from the default value specified by the system designer.

The choice: Auto, 2T, 3T.

4.5.4.2 SDRAM Clock Ratio Div By

This item allows user to set the DRAM timing.

SDRAM timing = CPU Freq. / Ratio

The choice: 3, 4

4.5.4.3 16-bit I/O Recovery (CLK)

The I/O recovery mechanism adds bus clock cycles between PCI-originated I/O cycles to the ISA bus. This delay takes place because the PCI bus is so much faster than the ISA bus.

The choice: from 1 to 16 CPU clocks.

4.5.4.4 8-bit I/O Recovery (CLK)

The I/O recovery mechanism adds bus clock cycles between PCI-originated I/O cycles to the ISA bus. This delay takes place because the PCI bus is so much faster than the ISA bus.

This item allows you to determine the recovery time allowed for 8-bit I/O.

The choice: from 1 to 16 CPU clocks.

4.5.4.5 USB Controller / USB Legacy Support

Select *Enabled* if your system contains a Universal Serial Bus (USB) controller and you have a USB keyboard.

The choice: Enabled, Disabled.

4.5.4.6 CS9211 Panel Support

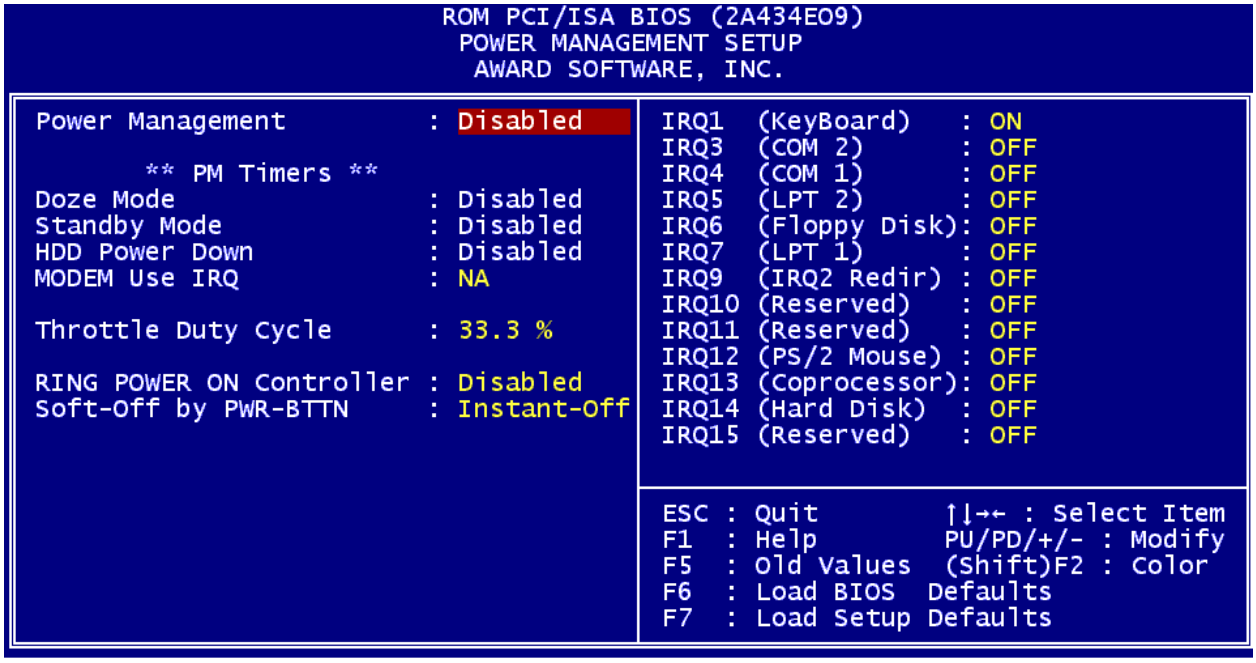
This item only show in EBC-5410D model, it could let you to select the type and resolution of Flat Panel.

The choice:

640x480 8B DSTN MONO	640x480 8 Bits DSTN MONO
640x480 8B DSTN COLOR	640x480 8 Bits DSTN COLOR
640x480 16B DSTN COLOR	640x480 16Bits DSTN COLOR
640x480 18B TFT COLOR	640x480 18Bits TFT COLOR
800x600 16B DSTN COLOR	800x600 16Bits DSTN COLOR
800x600 18B TFT COLOR	800x600 18Bits TFT COLOR
1024x768 24B DSTN COLOR	1024x768 24Bits DSTN COLOR
1024x768 18B TFT COLOR	1024x768 18Bits TFT COLOR

4.5.5 Power Management Setup

The Power Management Setup allows you to configure you system to most effectively save energy while operating in a manner consistent with your own style of computer use.


ROM PCI/ISA BIOS (2A434E09)
POWER MANAGEMENT SETUP
AWARD SOFTWARE, INC.
Power Management : Disabled
** PM Timers **
Doze Mode : Disabled
Standby Mode : Disabled
HDD Power Down : Disabled
MODEM Use IRQ : NA
Throttle Duty Cycle : 33.3 %
RING POWER ON Controller : Disabled
Soft-Off by PWR-BTTN : Instant-Off
IRQ1 (KeyBoard) : ON
IRQ3 (COM 2) : OFF
IRQ4 (COM 1) : OFF
IRQ5 (LPT 2) : OFF
IRQ6 (Floppy Disk): OFF
IRQ7 (LPT 1) : OFF
IRQ9 (IRQ2 Redir) : OFF
IRQ10 (Reserved) : OFF
IRQ11 (Reserved) : OFF
IRQ12 (PS/2 Mouse) : OFF
IRQ13 (Coprocessor): OFF
IRQ14 (Hard Disk) : OFF
IRQ15 (Reserved) : OFF
ESC : Quit ↑↓→← : Select Item
F1 : Help PU/PD/+/- : Modify
F5 : Old Values (Shift)F2 : Color
F6 : Load BIOS Defaults
F7 : Load Setup Defaults

4.5.5.1 Power Management

This category allows you to select the type (or degree) of power saving and is directly related to the following modes:

1. Doze Mode
2. Standby Mode
3. HDD Power Down

There are four selections for Power Management, three of which have fixed mode settings.

Disable (default)	No power management. Disables all four modes
Min. Power Saving	Minimum power management. Doze Mode = 1 hr. Standby Mode = 1 hr., Suspend Mode = 1 hr., and HDD Power Down = 15 min.
Max. Power Saving	Maximum power management -- **ONLY AVAILABLE FOR SL CPU's**. Doze Mode = 1 min., Standby Mode = 1 min., Suspend Mode = 1 min., and HDD Power Down = 1 min.
User Defined	Allow you to set each mode individually. When not disabled, each of the ranges is from 1 min. to 1 hr. except for HDD Power Down, which ranges from 1 min. to 15 min. and disable.

4.5.5.2 PM Timers

The following four modes are Green PC power saving functions which are only user configurable when *User Defined* Power Management has been selected. See above for available selections.

4.5.5.2.1 Doze Mode

When enabled and after the set time of system inactivity, the CPU clock will run at slower speed while all other devices still operate at full speed.

4.5.5.2.2 Standby Mode

When enabled and after the set time of system inactivity, the fixed disk drive and the video would be shut off while all other devices still operate at full speed.

4.5.5.2.3 HDD Power Down

When enabled and after the set time of system inactivity, the hard disk drive will be powered down while all other devices remain active.

4.5.5.2.4 Modem Use IRQ

This determines the IRQ in which the MODEM can use.

The choice: 3, 4, 5, 7, 9, 10, 11, NA.

4.5.5.2.5 Throttle Duty Cycle

Select the throttle duty cycle.

The choice: 12.5%, 33.3%, 50%, 75%.

4.5.5.3 Power Down & Resume Events

Power Down and Resume events are I/O events whose occurrence can prevent the system from entering a power saving mode or can awaken the system from such a mode. In effect, the system remains alert for anything, which occurs to a device which is configured as *On*, even when the system is in a power down mode.

The following is a list of IRQ's, **I**nterrupt **R**e**Q**uests, which can be exempted much as the COM ports and LPT ports above can. When an I/O device wants to gain the attention of the operating system, it signals this by causing an IRQ to occur. When the operating system is ready to respond to the request, it interrupts itself and performs the service.

As above, the choices are *On* and *Off. Off* is the default.

When set *Off*, activity will neither prevent the system from going into a power management mode nor awaken it.

- IRQ1 (Keyboard)
- IRQ3 (COM 2)
- IRQ4 (COM1)
- IRQ5 (LPT 2)
- IRQ6 (Floppy Disk)
- IRQ7 (LPT 1)
- IRQ9 (IRQ2 Redir)
- IRQ10 (Reserved)
- IRQ11 (Reserved)
- IRQ12 (PS/2 Mouse)
- IRQ13 (Coprocessor)
- IRQ14 (Hard Disk)
- IRQ15 (Reserved)

4.5.5.3.1 Ring Power on Controller

An input signal on the serial Ring Indicator (RI) line (in other words, an incoming call on the modem) awakens the system from a soft off state.

The choice: enable, disabled.

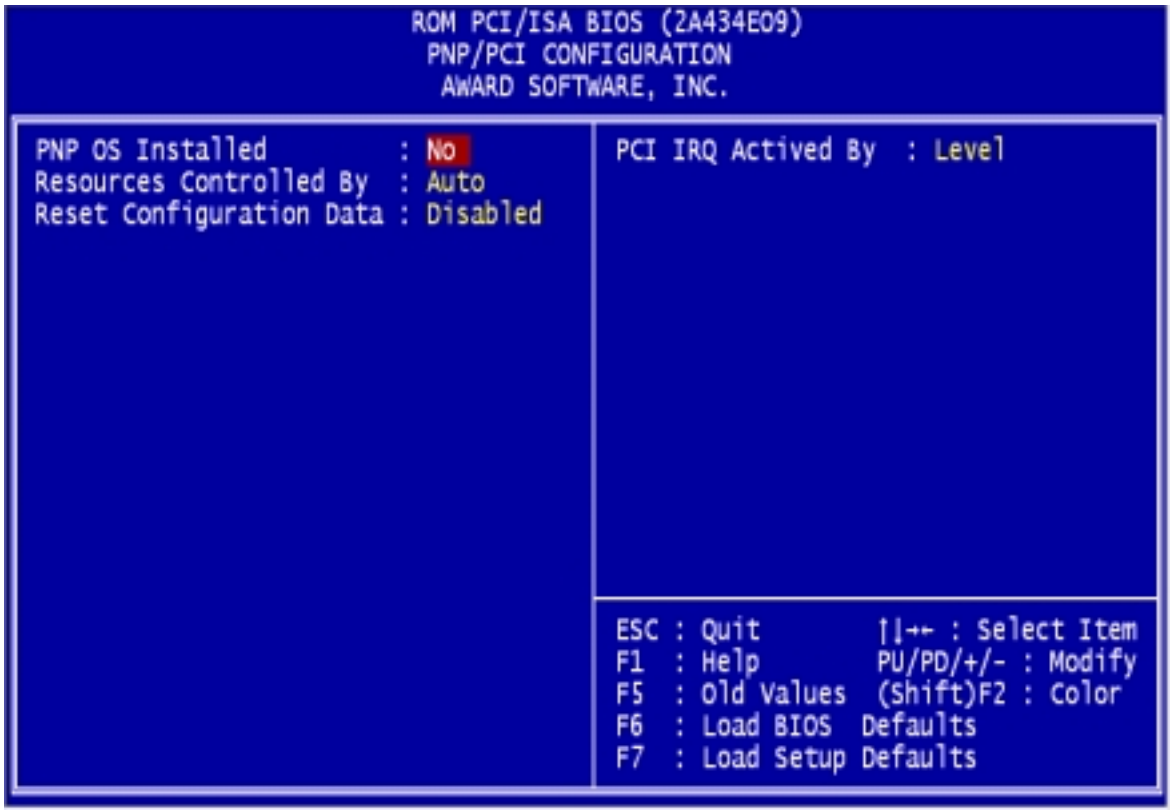
4.5.5.3.2 Soft-Off by PWR-BTTN

Pressing the power button for more than 4 seconds forces the system to enter the Soft-Off state when the system has "hung".

The choice: Delay 4 Sec, Instant-Off.

4.5.6 PnP/PCI Configuration Setup

This section describes configuring the PCI bus system. PCI, or **P**ersonal **C**omputer **I**nterconnect, is a system, which allows I/O devices to operate at speeds nearing the speed the CPU itself, uses when communicating with its own special components. This section covers some very technical items and it is strongly recommended that only experienced users should make any changes to the default settings.


ROM PCI/ISA BIOS (2A434E09)
PNP/PCI CONFIGURATION
AWARD SOFTWARE, INC.
PNP OS Installed : No
Resources Controlled By : Auto
Reset Configuration Data : Disabled
PCI IRQ Actived By : Level
ESC : Quit ↑↓→← : Select Item
F1 : Help PU/PD/+/- : Modify
F5 : Old Values (Shift)F2 : Color
F6 : Load BIOS Defaults
F7 : Load Setup Defaults

4.5.6.1 PnP OS Installed

This determines whether the PnP OS is installed or not.

Choices are *Yes* and *No*.

4.5.6.2 Resource Controlled By

The Award Plug and Play BIOS has the capacity to automatically configure all of the boot and Plug and Play compatible devices. However, this capability means absolutely nothing unless you are using a Plug and Play operating system such as Windows® 95.

Choices are *Auto* and *Manual*.

4.5.6.3 Reset Configuration Data

This item allows you to determine reset the configuration data or not.

Choices are *Enabled* and *Disabled*.

4.5.6.4 IRQ - *X* / DMA – *X* Assigned To

This item allows you to determine the IRQ / DMA assigned to the ISA bus and is not available to any PCI slot.

Choices are *Legacy ISA* and *PCI/ISA PnP*.

4.5.6.5 PCI IRQ Activated By

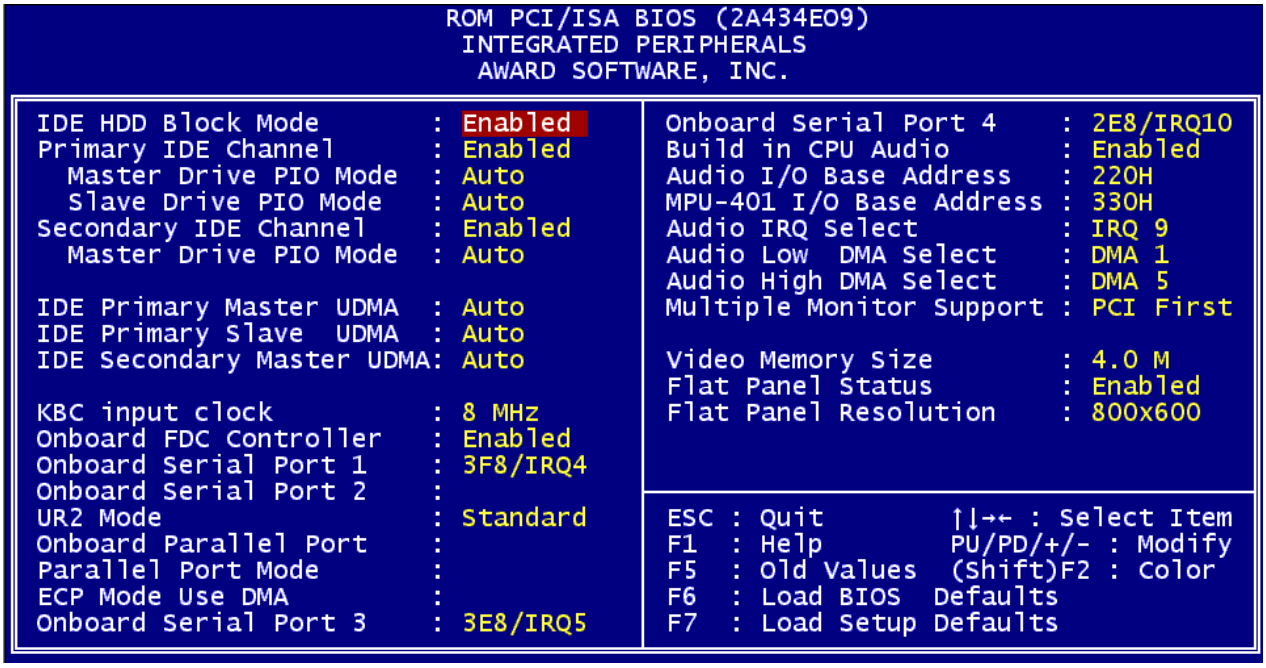
This sets the method by which the PCI bus recognizes that an IRQ service is being requested by a device. Under all circumstances, you should retain the default configuration unless advised otherwise by your system's manufacturer.

Choices are *Level* and *Edge*.

4.5.6.6 Used MEM Base Addr

4.5.6.7 Used MEM Length

4.5.7 Integrated Peripherals Features Setup


ROM PCI/ISA BIOS (2A434EO9)
INTEGRATED PERIPHERALS
AWARD SOFTWARE, INC.
IDE HDD Block Mode : Enabled
Primary IDE Channel : Enabled
Master Drive PIO Mode : Auto
Slave Drive PIO Mode : Auto
Secondary IDE Channel : Enabled
Master Drive PIO Mode : Auto
IDE Primary Master UDMA : Auto
IDE Primary Slave UDMA : Auto
IDE Secondary Master UDMA: Auto
KBC input clock : 8 MHz
Onboard FDC Controller : Enabled
Onboard Serial Port 1 : 3F8/IRQ4
Onboard Serial Port 2 :
UR2 Mode : Standard
Onboard Parallel Port :
Parallel Port Mode :
ECP Mode Use DMA :
Onboard Serial Port 3 : 3E8/IRQ5
Onboard Serial Port 4 : 2E8/IRQ10
Build in CPU Audio : Enabled
Audio I/O Base Address : 220H
MPU-401 I/O Base Address : 330H
Audio IRQ Select : IRQ 9
Audio Low DMA Select : DMA 1
Audio High DMA Select : DMA 5
Multiple Monitor Support : PCI First
Video Memory Size : 4.0 M
Flat Panel Status : Enabled
Flat Panel Resolution : 800x600
ESC : Quit ↑↓→← : Select Item
F1 : Help PU/PD/+/- : Modify
F5 : Old Values (Shift)F2 : Color
F6 : Load BIOS Defaults
F7 : Load Setup Defaults

4.5.7.1 IDE HDD Block Mode

This allows your hard disk controller to use the fast block mode to transfer data to and from your hard disk drive (HDD).

Enabled	IDE controller uses block mode.
Disabled	IDE controller uses standard mode.

4.5.7.2 Primary/Secondary IDE Channel

You may separately disable the primary/second channel on an IDE interface installed in a PCI expansion slot.

4.5.7.3 IDE Primary/Secondary Master/Slave PIO Mode

The four IDE PIO (Programmed Input/Output) fields let you set a PIO mode (0-4) for each of the four IDE devices that the onboard IDE interface supports.

Modes 0 through 4 provide successively increased performance. In Auto mode, the system automatically determines the best mode for each device.

4.5.7.4 IDE Primary/Secondary Master/Slave UDMA

This item allows you to enable/disable the IDE Primary/Secondary Master / Slave UDMA mode.

The Choice: Auto, Disabled

4.5.7.5 KBC Input Clock

This item allows you to select the KBC input clock frequency.

The Choice: 6MHz, 8MHz, 12MHz, 16MHz.

4.5.7.6 Onboard FDC Controller

This should be enabled if your system has a floppy disk drive (FDD) installed on the system board and you wish to use it. Even when so equipped, if you add a higher performance controller, you will need to disable this feature.

The Choice: Enabled, Disabled.

4.5.7.7 Onboard Serial Port 1/Port 2

This item allows you to determine access onboard serial port 1/port 2 controller with which I/O address.

The Choice: 3F8/IRQ4, 2F8/IRQ3, 3E8/IRQ4, 2E8/IRQ3, Disabled, Auto.

4.5.7.8 UR2 Mode

This item allows you to determine the UART2 mode.

The Choice: Standard, Sharp IR, IrDA SIR.

4.5.7.9 Onboard Parallel Port

Select a logical LPT port name and matching address for the physical parallel (printer) port.

The choice: 378H/IRQ7, 278H/IRQ5, 3BCH/IRQ7, Disabled.

4.5.7.10 Parallel Port Mode

Select an operating mode for the onboard parallel port. Select Compatible or Extended unless you are certain both your hardware and software support EPP or ECP mode.

The choice: ECP+EPP1.7, EPP1.7+SPP, EPP1.9+SPP, ECP+EPP1.9, ECP, Normal, SPP,.

4.5.7.11 ECP Mode Use DMA

Select a DMA channel for the port.

The choice: 3, 1.

4.5.7.12 Onboard Serial Port 3/Port 4

This item allows you to determine access onboard serial port 1/port 2 controller with which I/O address.

The Choice: 3F8/IRQ5, 2F8/IRQ10, 3E8/IRQ5, 2E8/IRQ10, Disabled.

4.5.7.13 Build in CPU Audio

This item allows you to select the option of the build in CPU Audio function.

The choice: Enable, Disable.

4.5.7.14 Audio I/O Base Address

This chipset traps I/O accesses for Sound Blaster compatibility at 220H, 240H, 260H, or 280H.

The choice: 220H, 240H, 260H, 280H.

4.5.7.15 MPU-401 I/O Base Address

This chipset traps I/O accesses for ROLAND MPU 401 UART interface at 330H, 300H, or Disable.

The choice: 330H, 300H, Disable.

4.5.7.16 Audio IRQ Select

Select an interrupt for the audio port.

The choice: IRQ 9, IRQ 5, IRQ 7, IRQ 10, Disable.

4.5.7.17 Audio Low DMA Select

This chipset supports I/O trapping for low DMA accesses and allows you to select the Audio Low DMA type.

The choice: DMA 0, DMA 1, DMA 3, Disable.

4.5.7.18 Audio High DMA Select

This chipset supports I/O trapping for high DMA accesses and allows you to select the Audio High DMA type.

The choice: DMA 5, DMA 6, DMA 7, Disable.

4.5.7.19 Multiple Monitor Support

When you using external PCI VGA card, the chipset could supports dual display function in Windows 98 or Me.

The choice:

PCI First	Support Dual display, PCI VGA is Master, Onboard VGA Secondary
M/B First	Only using Onboard VGA.
NO Onboard	Only using PCI VGA , disable onboard VGA function.

4.5.7.20 Video Memory Size

Select the Video memory size.

The choice: 1M, 2M, 3M, 4M.

4.5.7.21 Flat Panel Status

This item allows you to select the option of the build in flat panel controller.

The choice: Enable, Disable.

4.5.7.22 Flat Panel Resolution

Select the flat panel resolution.

The choice: 640 x 480, 800 x 600, 1024 x 768.

4.5.8 Supervisor/User Password Setting

You can set either supervisor or user password, or both of then. The differences between are:

Supervisor password: can enter and change the options of the Setup menus.

User password: just can only enter but do not have the right to change the options of the Setup menus.

When you select this function, the following message will appear at the centre of the screen to assist you in creating a password.

ENTER PASSWORD:

Type the password, up to eight characters in length, and press <Enter>. The password typed now will clear any previously entered password from CMOS memory. You will be asked to confirm the password. Type the password again and press <Enter>. You may also press <Esc> to abort the selection and not enter a password.

To disable a password, just press <Enter> when you are prompted to enter the password. A message will confirm the password will be disabled. Once the password is disabled, the system will boot and you can enter Setup freely.

PASSWORD DISABLED.

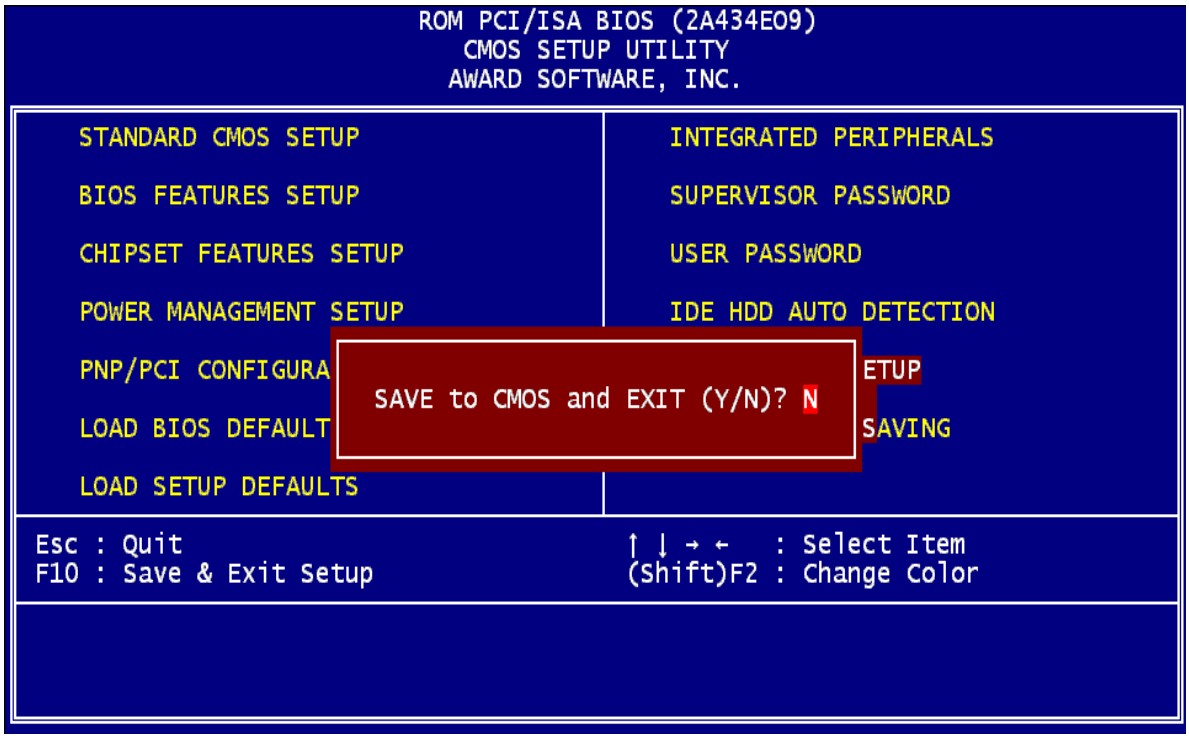
When a password has been enabled, you will be prompted to enter it every time you try to enter Setup. This prevents an unauthorized person from changing any part of your system configuration.

Additionally, when a password is enabled, you can also require the BIOS to request a password every time your system is rebooted. This would prevent unauthorized use of your computer.

You determine when the password is required within the BIOS Features Setup Menu and its Security option. If the Security option is set to "System", the password will be required both at boot and at entry to Setup. If set to "Setup", prompting only occurs when trying to enter Setup.

4.5.9 Exit Selecting

4.5.9.1 Save & Exit Setup

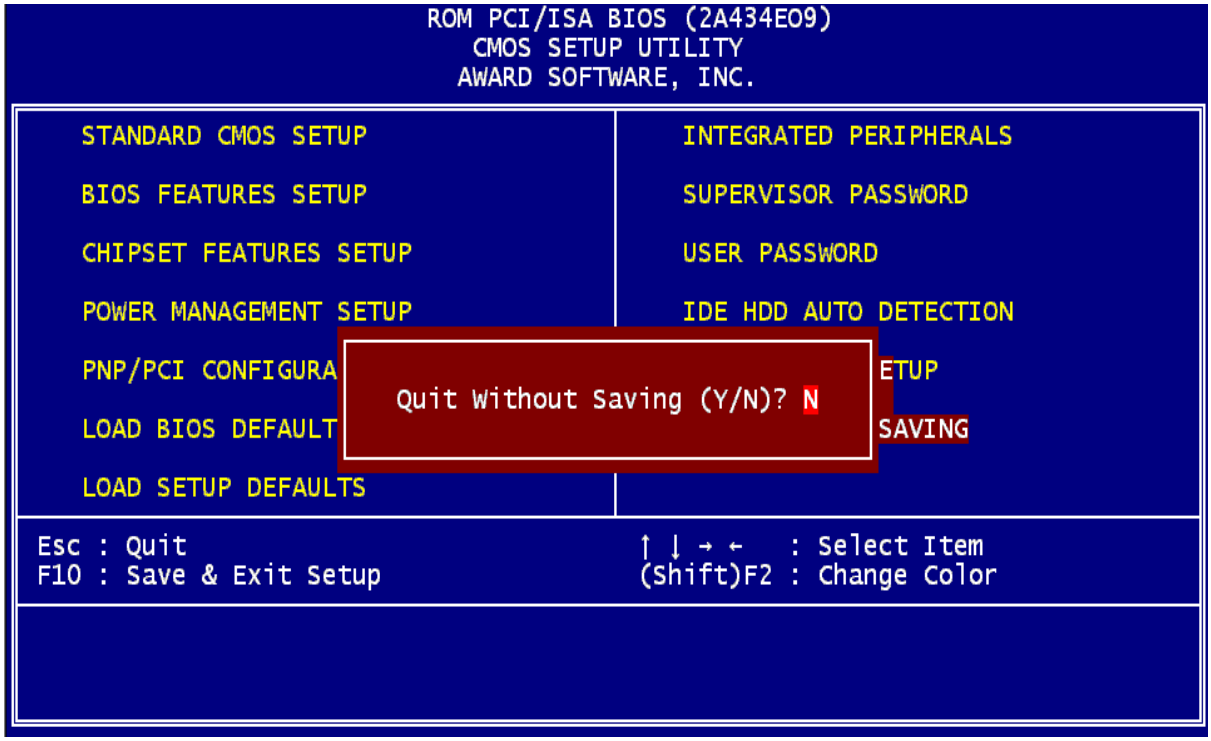


Pressing <Enter> on this item asks for confirmation:

```
Save to CMOS and EXIT (Y/N)?  Y
```

Pressing “Y” stores the selections made in the menus in CMOS – a special section of memory that stays on after you turn your system off. The next time you boot your computer, the BIOS configures your system according to the Setup selections stored in CMOS. After saving the values the system is restarted again.

4.5.9.2 Exit Without Saving



Pressing <Enter> on this item asks for confirmation:

```
Quit without saving (Y/N)?  Y
```

This allows you to exit Setup without storing in CMOS any change. The previous selections remain in effect. This exits the Setup utility and restarts your computer.

5. Driver Installation

5.1 Driver installation for Ethernet Adapter

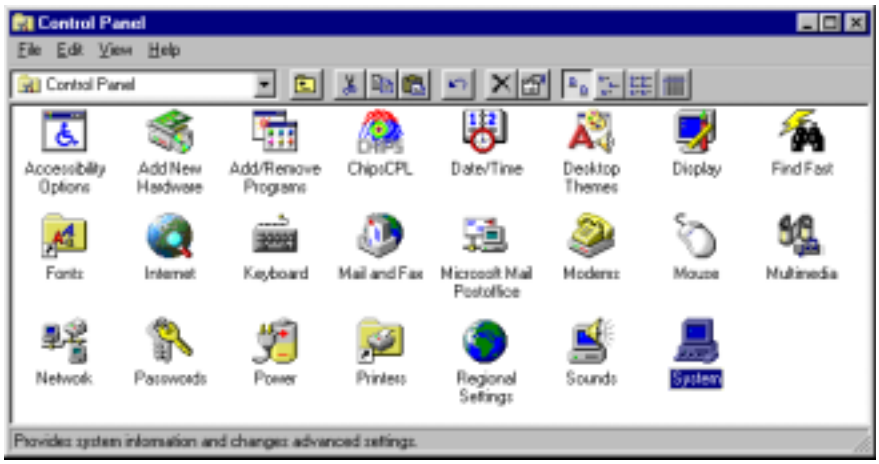
5.1.1 Windows 9x

The best way to install the driver for the Ethernet controller is to use the plug and play system of Windows 9x. The following procedures illustrate how the installation can be done.

1. If a driver for the Ethernet controller is already installed this must be removed first. This can be done by the following steps shown below.

   - Click the '*Start*' button, click on '*Settings*' and on '*Control panel*' to open the control panel.

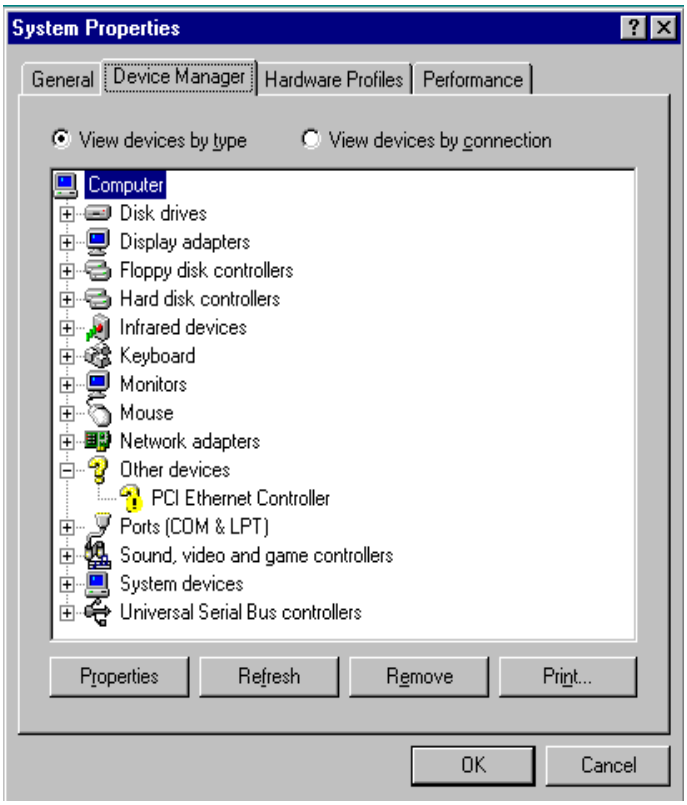
     Your display should now look as below (possibly with different size and icons):



   - Double click the '*System*' icon (highlighted above).
   - Select the '*Device Manager*' tab.

- If the '*Network adapters'* line is present, expand the line and remove the PCI Ethernet Controller adapters. This is done by selecting the line and clicking the '*Remove'* button.

  Before removal of the adapter(s), your screen might look like this:



- When all adapters are removed (or none were present), a new driver can be installed.

2. Reboot the computer.

3. During the boot the network adapter should be detected as shown below:

Add New Hardware Wizard
This wizard searches for new drivers for:
PCI Ethernet Controller
A device driver is a software program that makes a hardware device work.
< Back
Next >
Cancel

Add New Hardware Wizard
What do you want Windows to do?
Search for the best driver for your device. (Recommended).
Display a list of all the drivers in a specific location, so you can select the driver you want.
< Back
Next >
Cancel

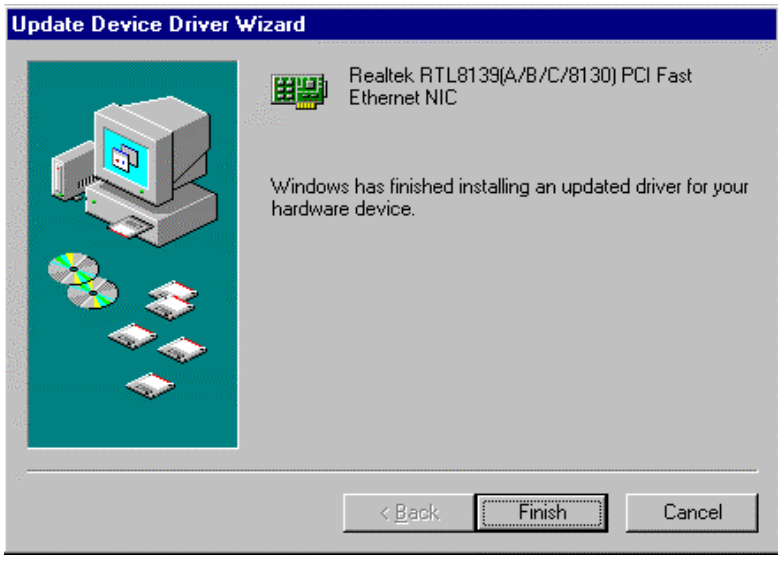
4. Specify the location of network adapter and click '*Next*' (see below).

Add New Hardware Wizard
Windows will search for new drivers in its driver database on your hard drive, and in any of the following selected locations. Click Next to start the search.
Floppy disk drives
CD-ROM drive
Microsoft Windows Update
Specify a location:
D:\ECM-5410\Driver\Network\Rtl8139c\WIN98
Browse...
< Back
Next >
Cancel

5. Click the '*Next*' button.

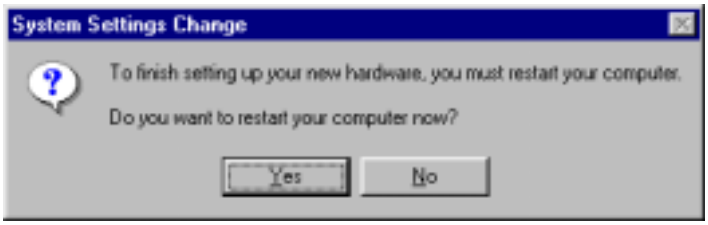
Add New Hardware Wizard
Windows driver file search for the device:
Realtek RTL8139(A/B/C/8130) PCI Fast Ethernet NIC
Windows is now ready to install the best driver for this device. Click Back to select a different driver, or click Next to continue.
Location of driver:
D:\ECM-5410\DRIVER\NETWORK\RTL813
< Back
Next >
Cancel

6. Click the '*Finish*' button.


Update Device Driver Wizard
Realtek RTL8139(A/B/C/8130) PCI Fast Ethernet NIC
Windows has finished installing an updated driver for your hardware device.
< Back
Finish
Cancel

7. Depending on the configuration, a request for the windows disks or CD-ROM may be necessary. Insert the disk / CD-ROM and click the '*OK*' button. An entry of the directory for the files may then be required. After typing the path name, click the '*OK*' button.

8. To complete the installation, reboot the computer by clicking the '*Yes*' button in the window shown below.


System Settings Change
To finish setting up your new hardware, you must restart your computer.
Do you want to restart your computer now?
Yes
No

9. After the system restarts, the network adapter should be installed. Protocols, clients etc. may now be installed for the network in use.

10. Further configuration of the adapter may be made in the '*Advanced*' section of the driver properties. These options may be accessed through the '*Network*' icon in the control panel (Select the network adapter, click the '*Properties*' button and select the '*Advanced*' tab).

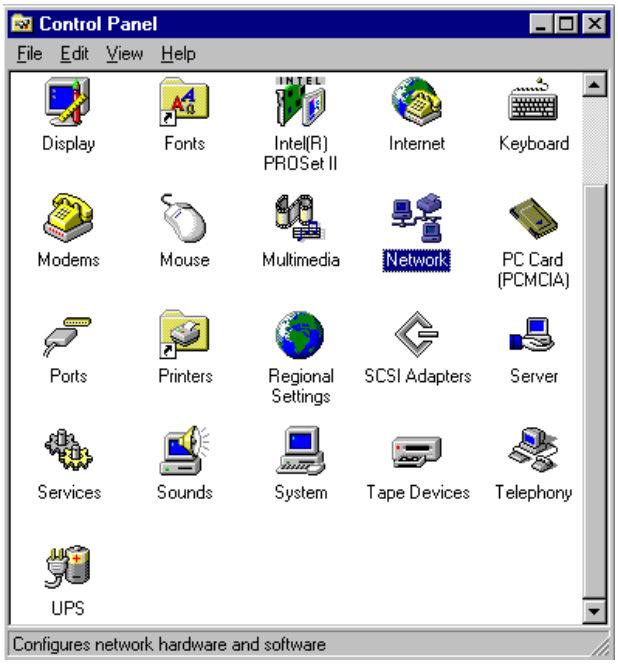
5.1.2 Windows NT 4.0 Ethernet Installation

A driver for the Realtek RTL8139C Ethernet controller on board is included in the attached supporting CD-ROM. The driver for this adapter is denoted 'Realtek RTL8139(A/B/C) PCI Fast Ethernet Adapter'. This driver may be installed in two ways:

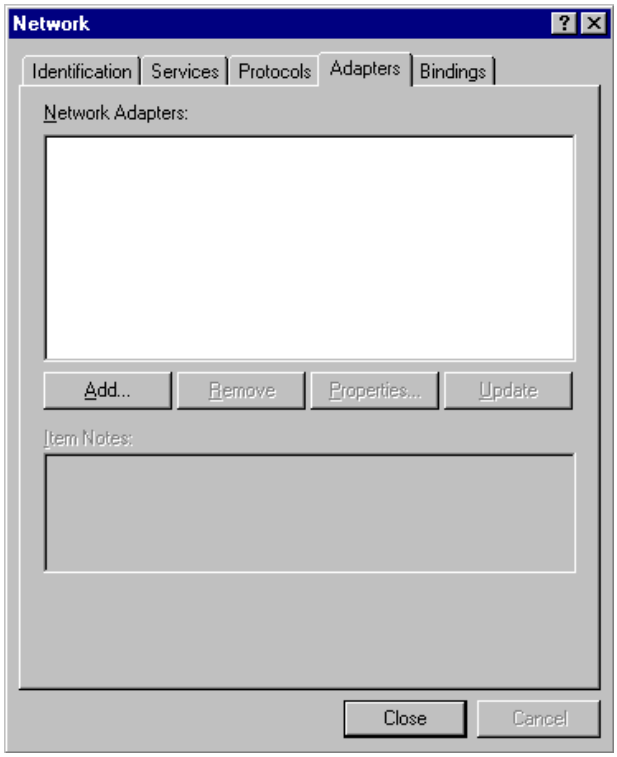
- During the installation process where the network may be configured as an integrated part. In this case the adapter may be chosen or auto-detected when the network adapter is to be installed.
- In the network settings after Windows NT 4.0 is installed.

The following procedures describe the steps to install the Network adapter driver on Windows NT 4.0.

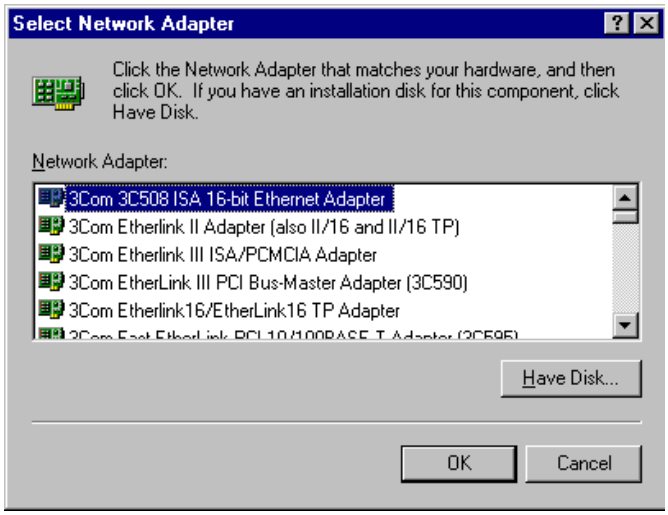
1. Click the '*Start*' button on the task bar. Select '*Settings*' and '*Control Panel*' to start the control panel shown below:



2. Double click the '*Network*' icon and then click the '*Adapters*' tab on the following window. A window as the one shown below should now appear.

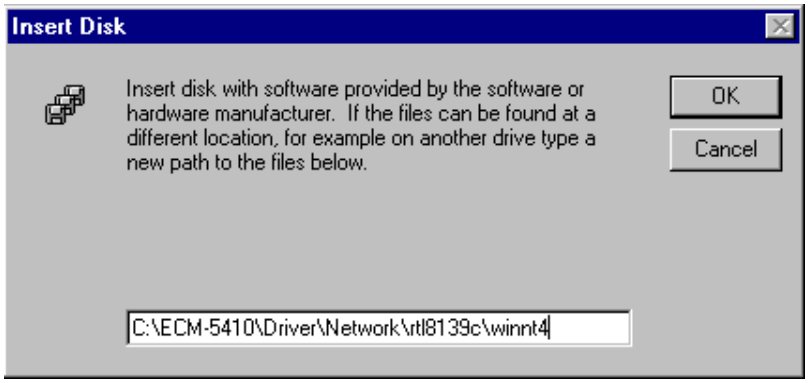


3. Click the '*Add...*' button, and the following window should appear.

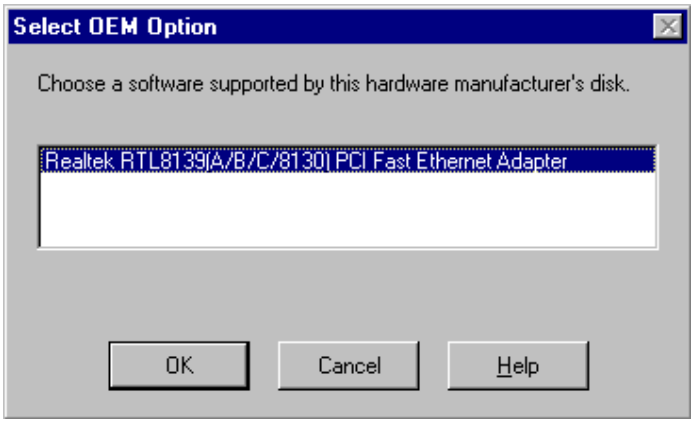

Select Network Adapter
Click the Network Adapter that matches your hardware, and then click OK. If you have an installation disk for this component, click Have Disk.
Network Adapter:
3Com 3C508 ISA 16-bit Ethernet Adapter
3Com Etherlink II Adapter (also II/16 and II/16 TP)
3Com Etherlink III ISA/PCMCIA Adapter
3Com EtherLink III PCI Bus-Master Adapter (3C590)
3Com Etherlink16/EtherLink16 TP Adapter
Have Disk...
OK
Cancel

4. Click the '*Have Disk…*' button to install the Network adapter driver from CD-ROM. A window as the one shown below should now appear.

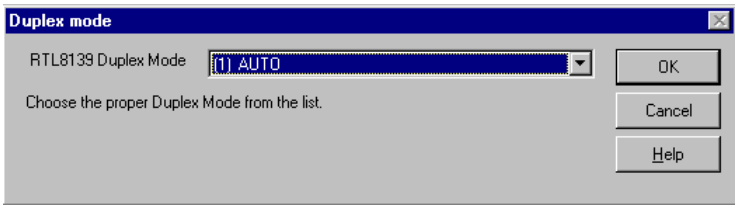
5. Locate the path of Network adapter driver and click the '*OK*' button.


Insert Disk
Insert disk with software provided by the software or hardware manufacturer. If the files can be found at a different location, for example on another drive type a new path to the files below.
OK
Cancel
C:\ECM-5410\Driver\Network\rtl8139c\winnt4

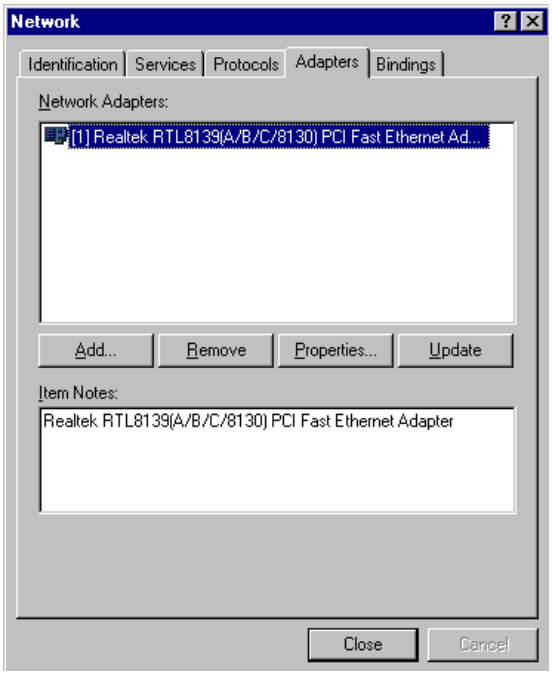
6. Select the '*Realtek RTL8139(A/B/C) PCI Fast Ethernet Adapter*' from the list (as shown below) and click the '*OK*' button.



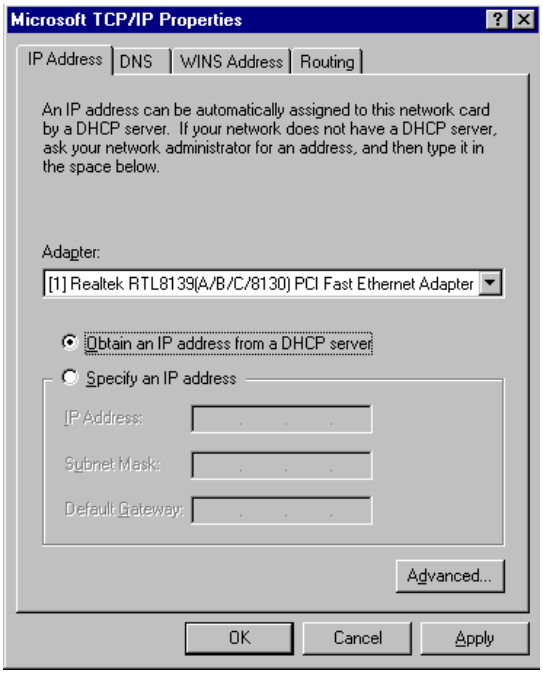
7. Select the '(1) Auto' to set RTL8139C Ethernet controller to Auto Duplex Mode (as shown below) and click the '*OK*' button.



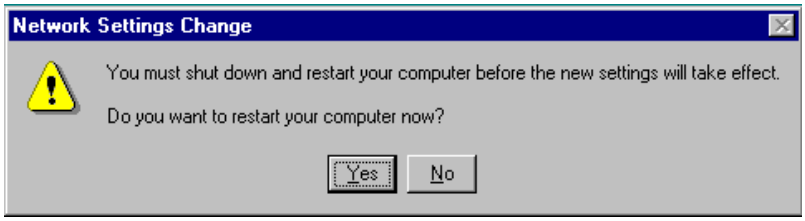
8. Click '*Close*' to accept the settings.



9. Protocols, Services etc. may now be installed and configured for the network to be used. An example is shown below.


Microsoft TCP/IP Properties
IP Address
DNS
WINS Address
Routing
An IP address can be automatically assigned to this network card by a DHCP server. If your network does not have a DHCP server, ask your network administrator for an address, and then type it in the space below.
Adapter:
[1] Realtek RTL8139(A/B/C/8130) PCI Fast Ethernet Adapter
Obtain an IP address from a DHCP server
Specify an IP address
IP Address:
Subnet Mask:
Default Gateway:
Advanced...
OK
Cancel
Apply

10. To complete the installation, reboot the computer by clicking the '*Yes*' button in the window shown below.


Network Settings Change
You must shut down and restart your computer before the new settings will take effect.
Do you want to restart your computer now?
Yes
No

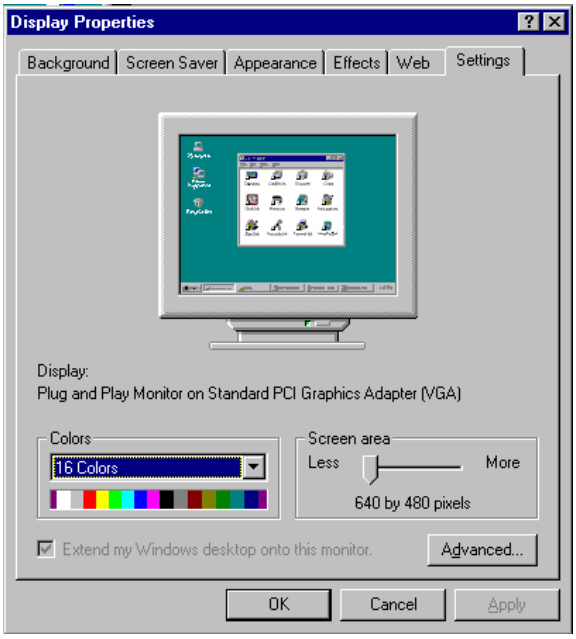
5.2 Driver Installation for Display Adapter

5.2.1 Windows 9x

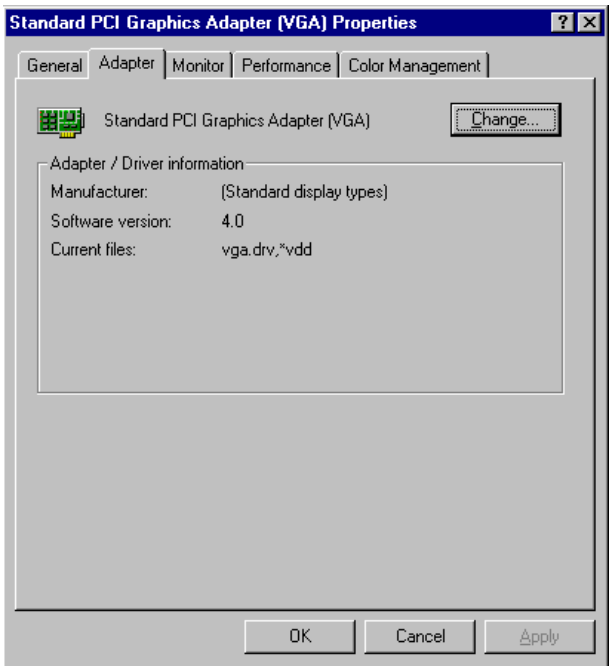
The following steps will install the display driver for the '*National Geode XpressGRAPHICS*' display controller.

1. Click the '*Start*' button on the task bar, select '*Settings*' and '*Control Panel*' from the sub-menu. This should start the Control Panel as shown below:

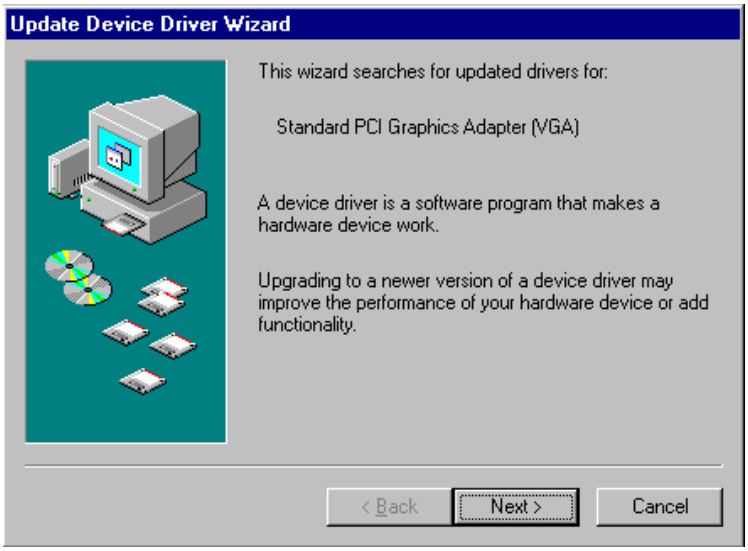
2. Double click the '*Display*' icon and select the '*Settings*' tab as shown below.



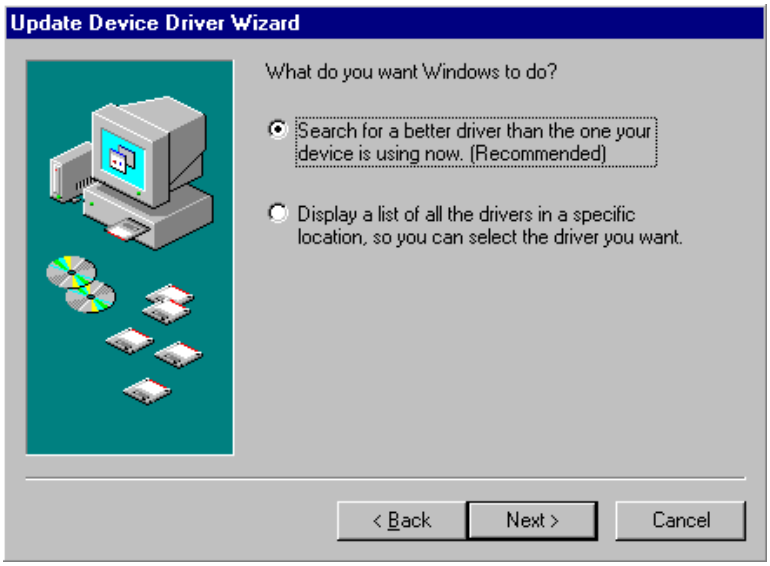
3. Click the '*Advanced…*' button. This will show the following window. Click the '*Change…*' button in the Adapter Type frame to select another driver. Your display will probably have another driver then the '*Standard PCI Graphics Adapter (VGA)*' installed at this moment.



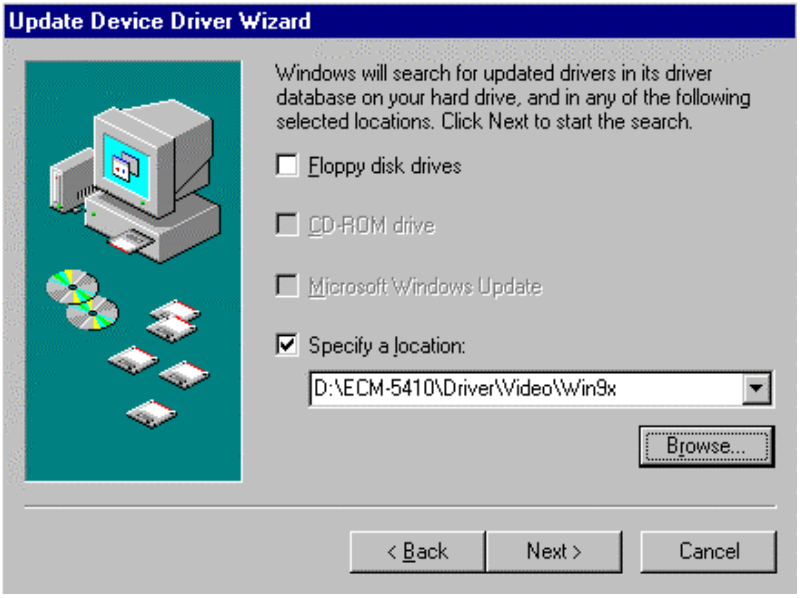
4. Click the '*Next*' to update the display driver.


Update Device Driver Wizard
This wizard searches for updated drivers for:
Standard PCI Graphics Adapter (VGA)
A device driver is a software program that makes a hardware device work.
Upgrading to a newer version of a device driver may improve the performance of your hardware device or add functionality.
< Back
Next >
Cancel

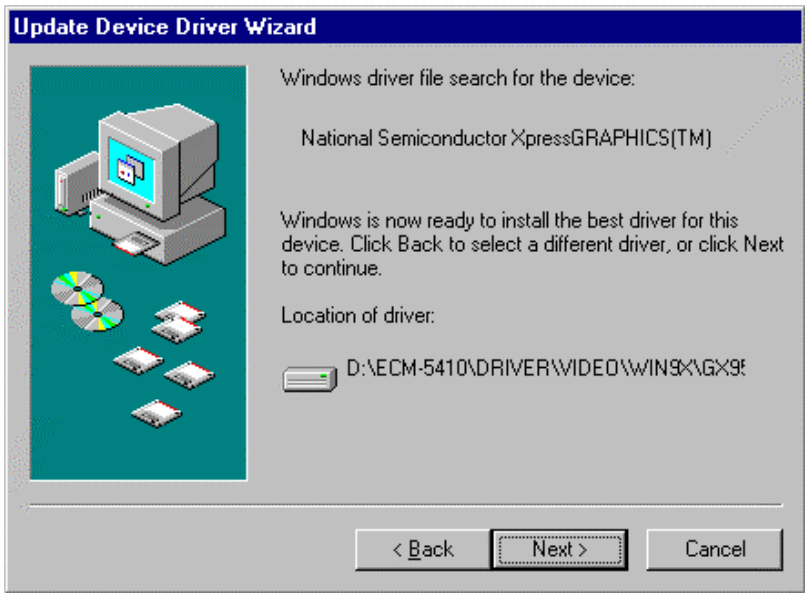
5. Click the '*Next*' to continue the display driver installation.


Update Device Driver Wizard
What do you want Windows to do?
Search for a better driver than the one your device is using now. (Recommended)
Display a list of all the drivers in a specific location, so you can select the driver you want.
< Back
Next >
Cancel

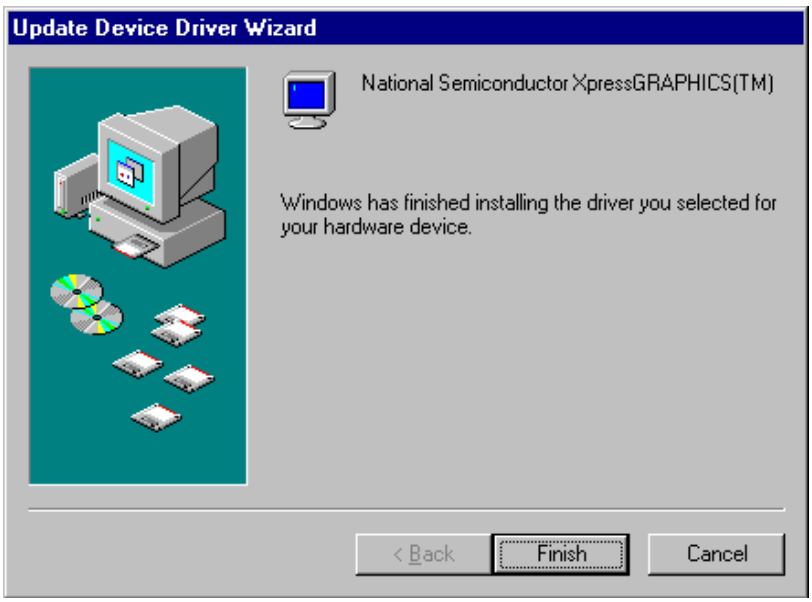
6. Locate the path of Graphics adapter driver and click the '*Next*' button.


Update Device Driver Wizard
Windows will search for updated drivers in its driver database on your hard drive, and in any of the following selected locations. Click Next to start the search.
Floppy disk drives
CD-ROM drive
Microsoft Windows Update
Specify a location:
D:\ECM-5410\Driver\Video\Win9x
Browse...
< Back
Next >
Cancel

7. The driver files will now be read and the display adapter is shown as the following. Click the '*Next*' button to install the display driver.


Update Device Driver Wizard
Windows driver file search for the device:
National Semiconductor XpressGRAPHICS(TM)
Windows is now ready to install the best driver for this device. Click Back to select a different driver, or click Next to continue.
Location of driver:
D:\ECM-5410\DRIVER\VIDEO\WIN9X\GX9
< Back
Next >
Cancel

8. Click the '*Finish*' button.



9. To complete the display driver installation, reboot the computer by clicking the '*Yes*' button in the window shown below.

System Settings Change
To finish setting up your new hardware, you must restart your computer.
Do you want to restart your computer now?
Yes
No

10. Further configuration of the display adapter may be made from the '*Display Properties*' window (follow step 1 above). The '*Settings*' tab allows you to change resolution, number of colours etc.

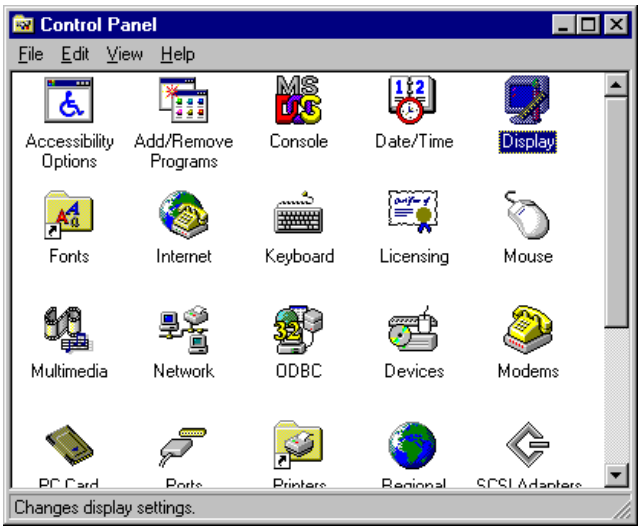
5.2.2 Windows NT 4.0 Display Installation

A display driver for Windows NT 4.0 is supplied with the system on the supporting CD-ROM.

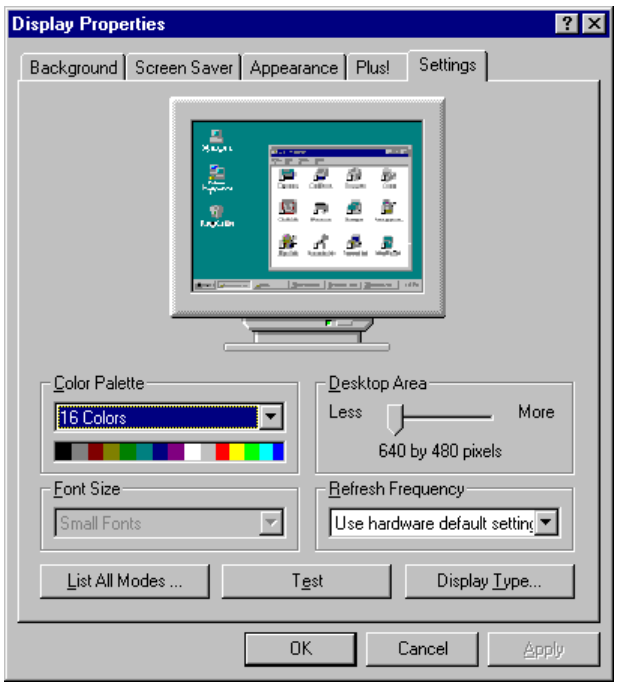
The driver installation may be performed according to the following steps.

1. Start the control panel by clicking the '*Start*' button, click '*Settings*' and '*Control Panel*' from the sub-menu.

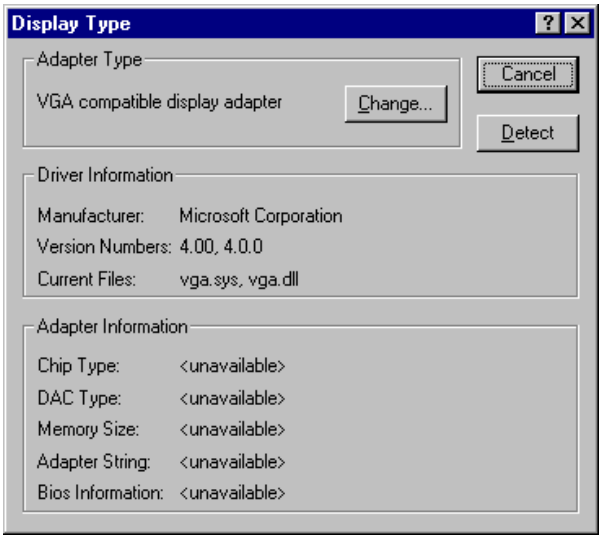
2. Double click the '*Display*' icon in the control panel as shown below:



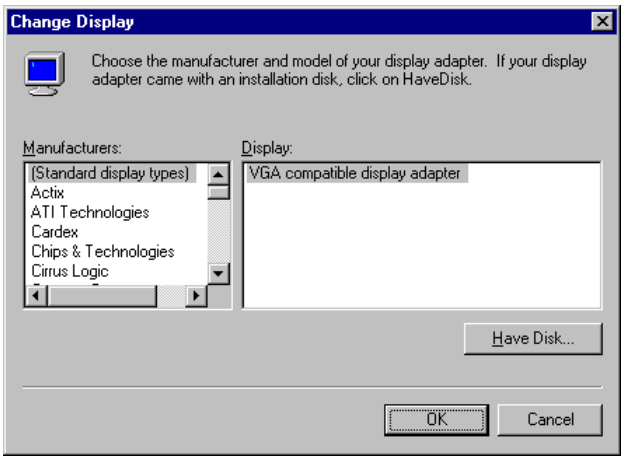
3. On the Display properties window, select the '*Settings*' tab as shown below:



4. Click the '*Display Type*' button and the following window should appear.

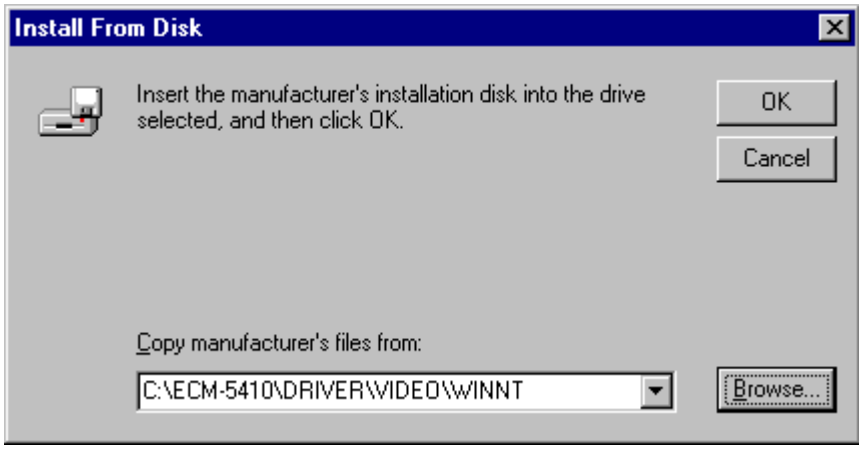


5. Click the '*Change*' button to select another driver. The following window should then appear.

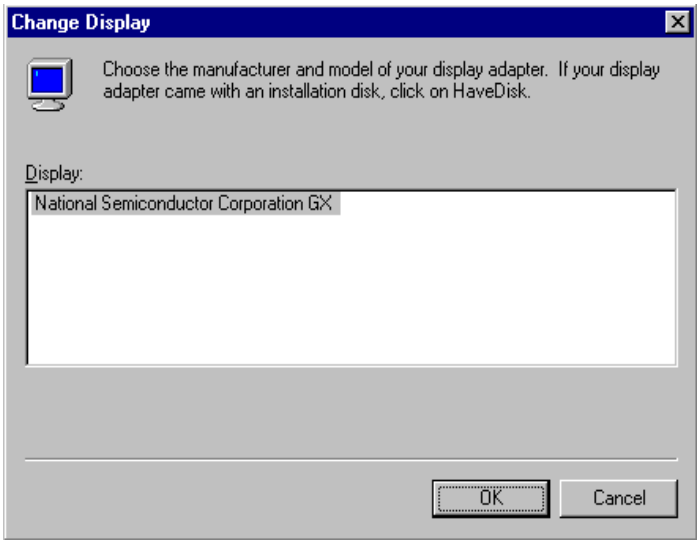


6. Since the driver should be supplied separately, click the '*Have Disk*' button.

7. Insert the attached supporting CD-ROM. The directory for the VGA driver may now be entered.



8. The display driver should now be listed as shown below. Click '*OK*' to accept.


Change Display
Choose the manufacturer and model of your display adapter. If your display adapter came with an installation disk, click on HaveDisk.
Display:
National Semiconductor Corporation GX
OK
Cancel

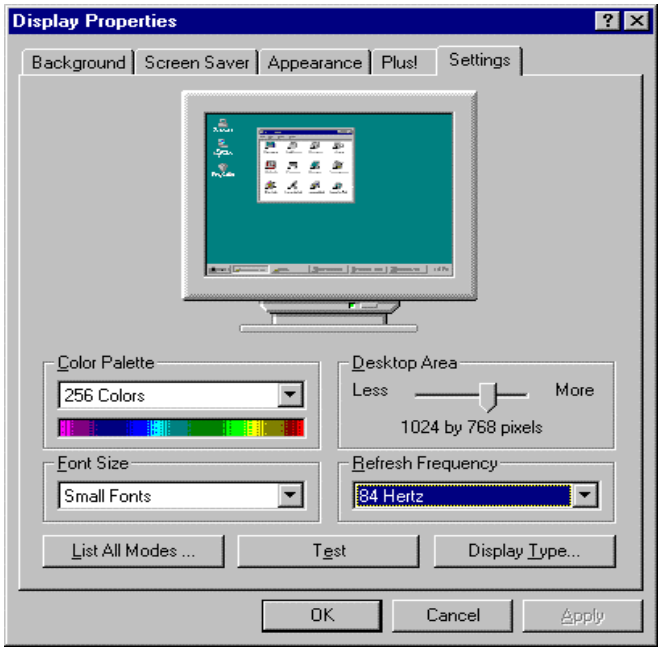
9. The driver will now be installed, and the following message should be shown shortly after:

Installing Driver
The drivers were successfully installed.
You must exit from the Display Properties window and reboot in order for the changes to take effect.
OK

10. Click '*OK*' and close the '*Display Type*' and '*Display Properties*' windows by clicking the '*Close*' button in each window.

11. After closing the '*Display Properties*' window, the computer must be restarted for the changes to take effect.

12. After the reboot, display resolution etc. may be changed in the '*Display Properties*' window (opened by following steps 1 and 2 above). An example is shown below:



13. Before accepting the new settings by pressing '*OK*', a test should be performed by clicking the '*Test*' button.

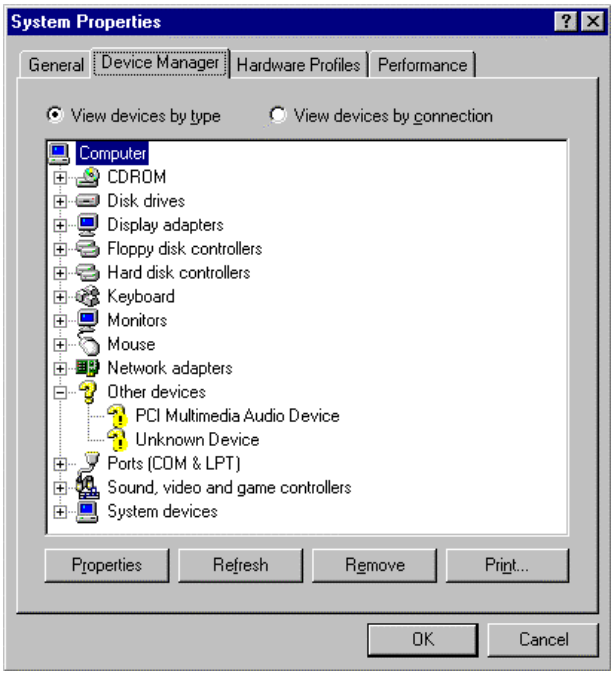
5.3 Driver Installation for Audio Adapter

5.3.1 Windows 9x

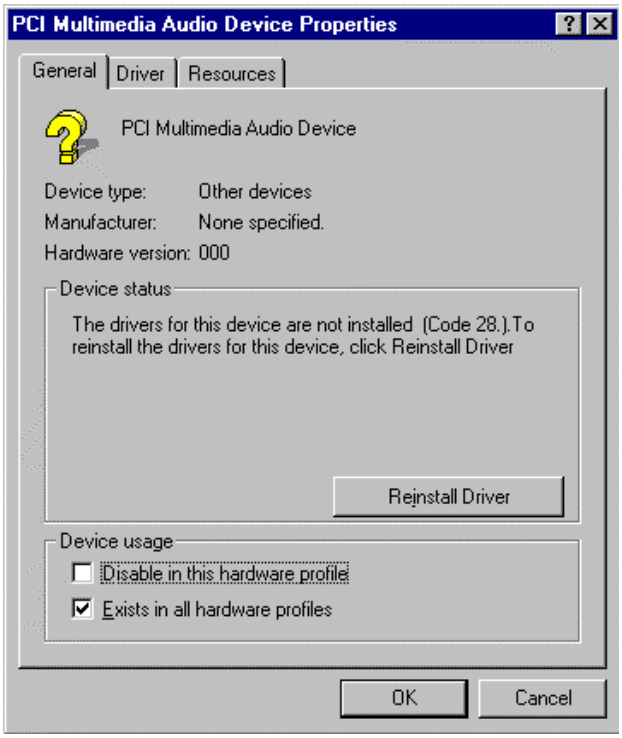
The following steps will install the display driver for the 'National Geode XpressGRAPHICS' display controller.

1. Click the '*Start*' button on the task bar, select '*Settings*' and '*Control Panel*' from the sub-menu. This should start the Control Panel as shown below:

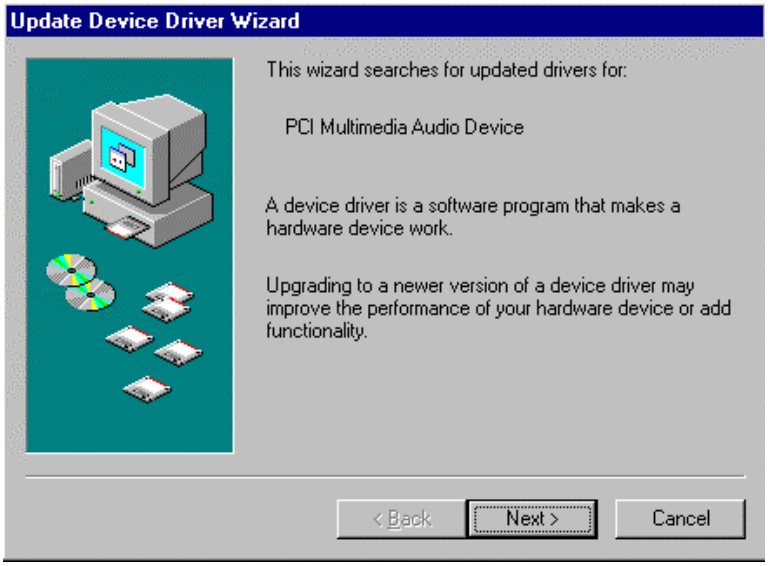
2. Double click the '*System*' icon and select the '*Device Manager*' tab as shown below.



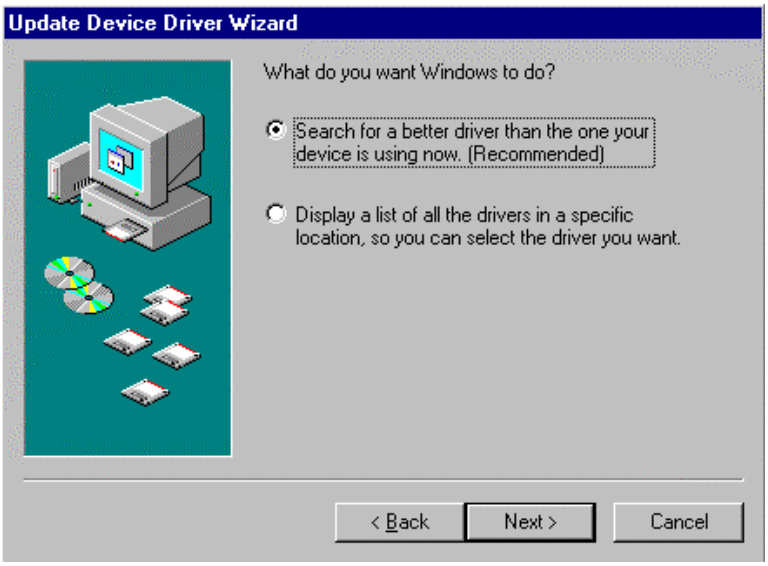
3. Select '*PCI Multimedia Audio Device*'. This will show the following window. Click the '*Reinstall Driver'* button.



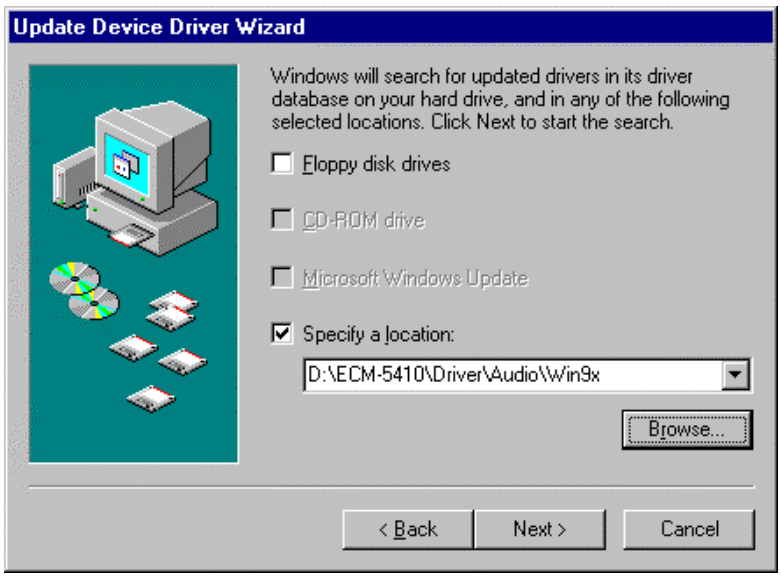
4. Click the '*Next*' to update the audio driver.


Update Device Driver Wizard
This wizard searches for updated drivers for:
PCI Multimedia Audio Device
A device driver is a software program that makes a hardware device work.
Upgrading to a newer version of a device driver may improve the performance of your hardware device or add functionality.
< Back
Next >
Cancel

5. Click the '*Next*' to continue the audio driver installation.


Update Device Driver Wizard
What do you want Windows to do?
Search for a better driver than the one your device is using now. (Recommended)
Display a list of all the drivers in a specific location, so you can select the driver you want.
< Back
Next >
Cancel

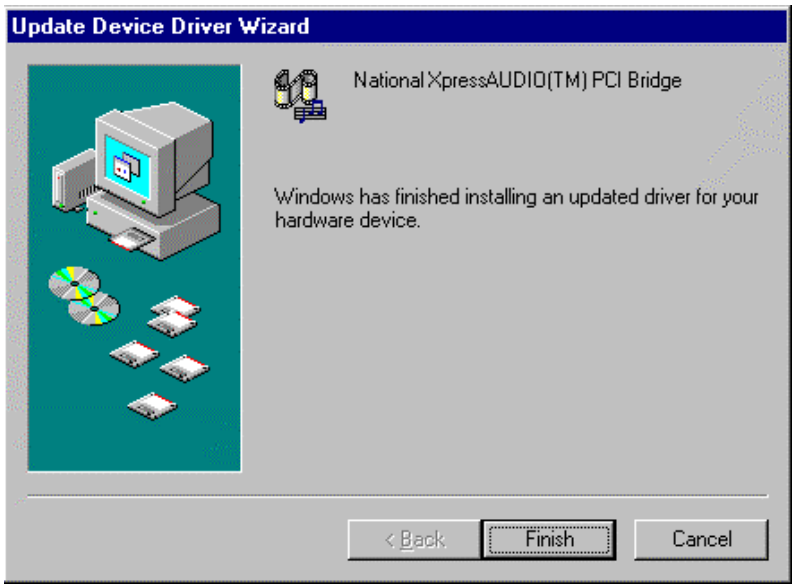
6. Locate the path of Audio adapter driver and click the '*Next*' button.


Update Device Driver Wizard
Windows will search for updated drivers in its driver database on your hard drive, and in any of the following selected locations. Click Next to start the search.
Floppy disk drives
CD-ROM drive
Microsoft Windows Update
Specify a location:
D:\ECM-5410\Driver\Audio\Win9x
Browse...
< Back
Next >
Cancel

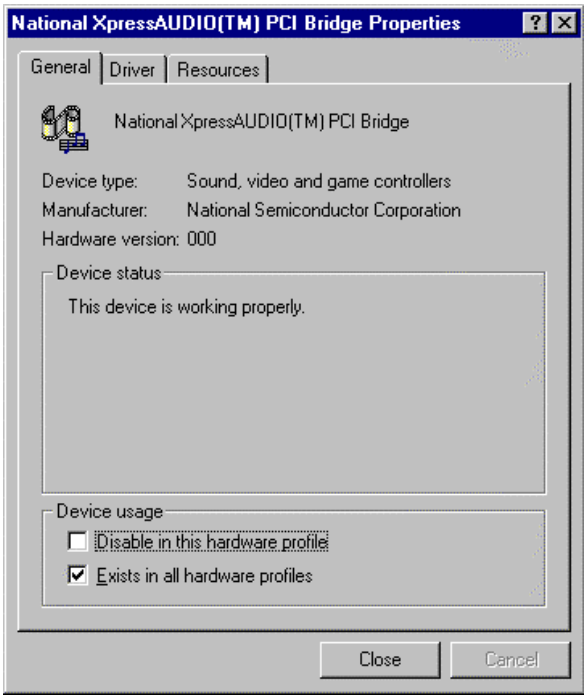
7. The driver files will now be read and the audio adapter is shown as the following. Click the '*Next*' button to install the audio driver.

Update Device Driver Wizard
Windows driver file search for the device:
National XpressAUDIO(TM) PCI Bridge
Windows is now ready to install the best driver for this device. Click Back to select a different driver, or click Next to continue.
Location of driver:
D:\ECM-5410\DRIVER\AUDIO\WIN9X\GXA
< Back
Next >
Cancel

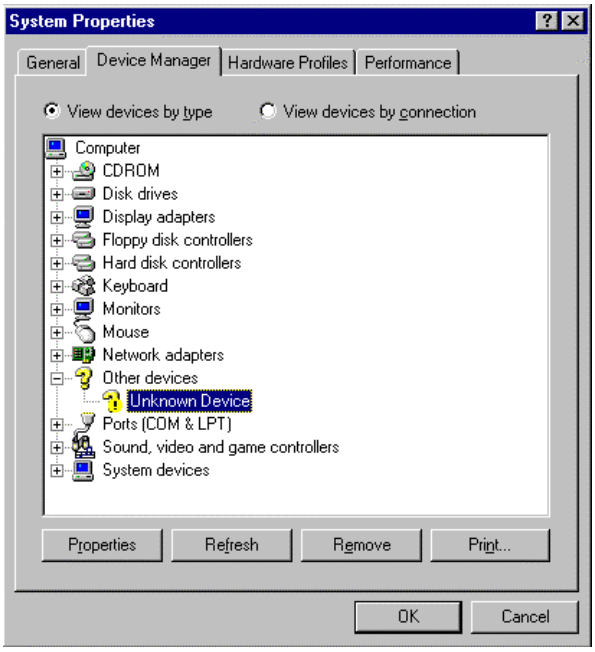
8. Click the '*Finish*' button.



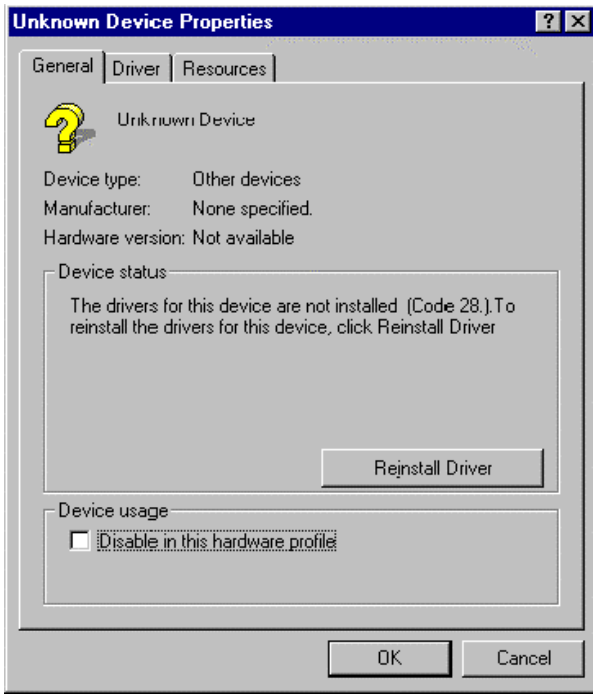
9. Click the '*Close*' button to close the '*National XpressAUDIO PCI Bridge Properties*' window.



10. Select the '*Device Manager*' tab in the '*System Properties*' windows as shown below.



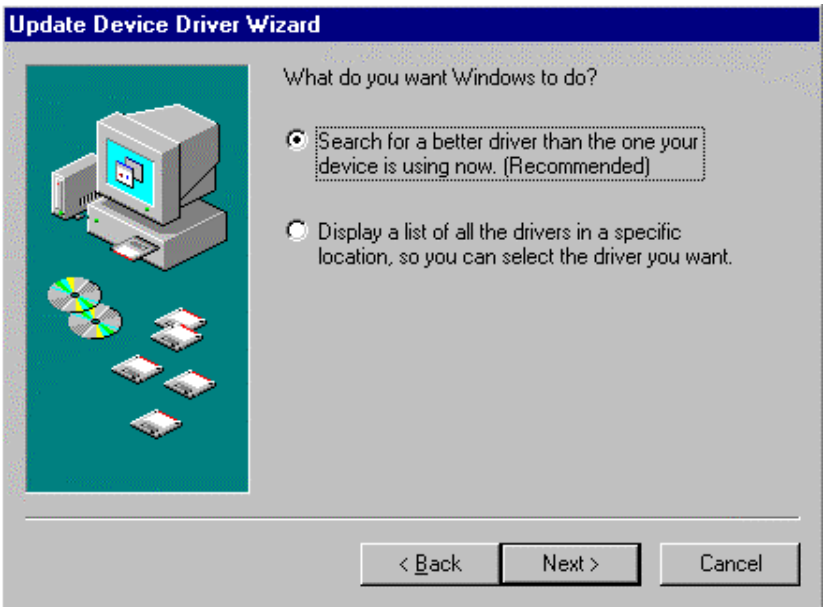
11.Select '*Unknown Device*'. This will show the following window. Click the '*Reinstall Driver'* button.



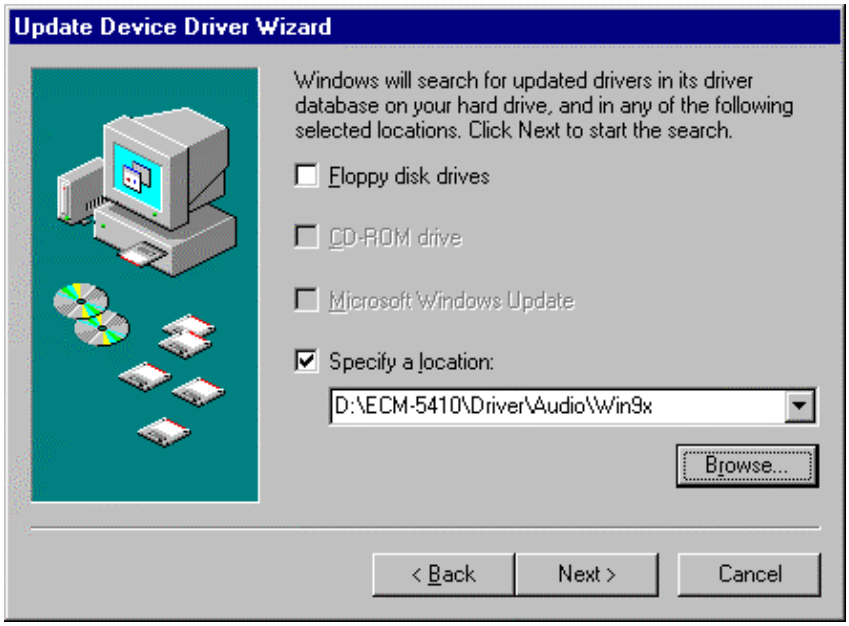
12.Click the '*Next*' to update the audio driver.

Update Device Driver Wizard
This wizard searches for updated drivers for:
Unknown Device
A device driver is a software program that makes a hardware device work.
Upgrading to a newer version of a device driver may improve the performance of your hardware device or add functionality.
< Back
Next >
Cancel

13.Click the '*Next*' to continue the audio driver installation.


Update Device Driver Wizard
What do you want Windows to do?
Search for a better driver than the one your device is using now. (Recommended)
Display a list of all the drivers in a specific location, so you can select the driver you want.
< Back
Next >
Cancel

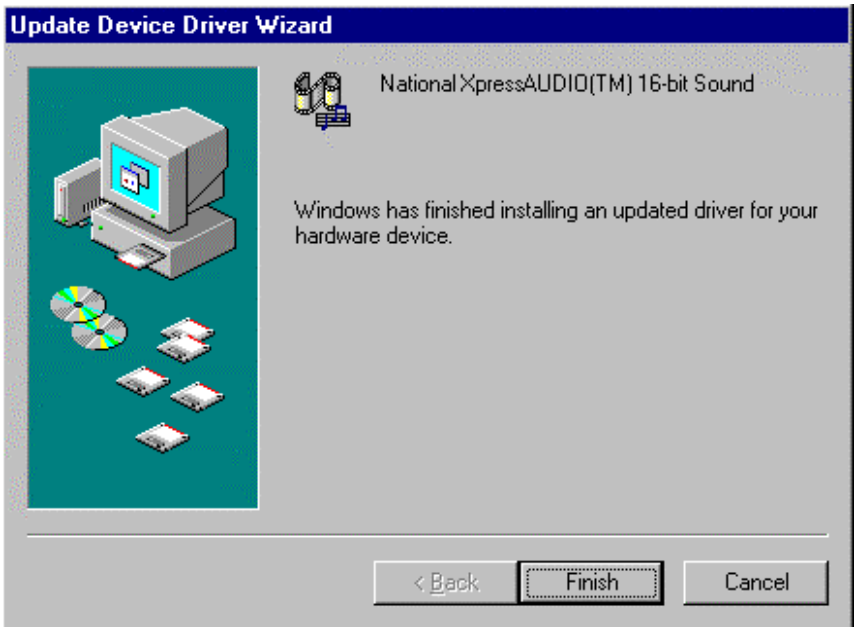
14.Locate the path of Audio adapter driver and click the '*Next*' button.


Update Device Driver Wizard
Windows will search for updated drivers in its driver database on your hard drive, and in any of the following selected locations. Click Next to start the search.
Floppy disk drives
CD-ROM drive
Microsoft Windows Update
Specify a location:
D:\ECM-5410\Driver\Audio\Win9x
Browse...
< Back
Next >
Cancel

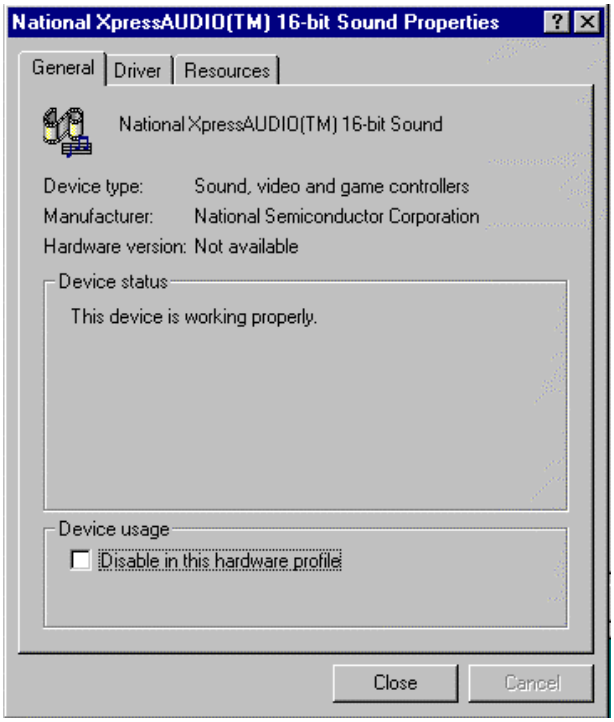
15.The driver files will now be read and the audio adapter is shown as the following. Click the '*Next*' button to install the audio driver.

Update Device Driver Wizard
Windows driver file search for the device:
National XpressAUDIO(TM) 16-bit Sound
Windows is now ready to install the best driver for this device. Click Back to select a different driver, or click Next to continue.
Location of driver:
D:\ECM-5410\DRIVER\AUDIO\WIN9X\GXA
< Back
Next >
Cancel

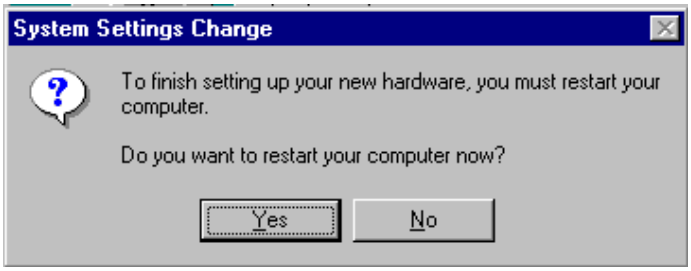
16.Click the '*Finish*' button.



17.Click the '*Close*' button to close the '*National XpressAUDIO 16-bit Sound Properties*' window.



18.To complete the audio driver installation, reboot the computer by clicking the '*Yes*' button in the window shown below.


System Settings Change
To finish setting up your new hardware, you must restart your computer.
Do you want to restart your computer now?
Yes
No

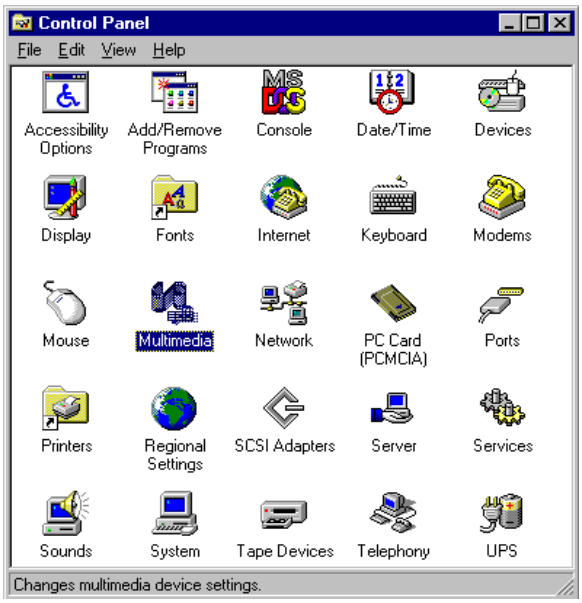
5.3.2 Windows NT 4.0 Audio Installation

An audio driver for Windows NT 4.0 is supplied with the system on the supporting CD-ROM.

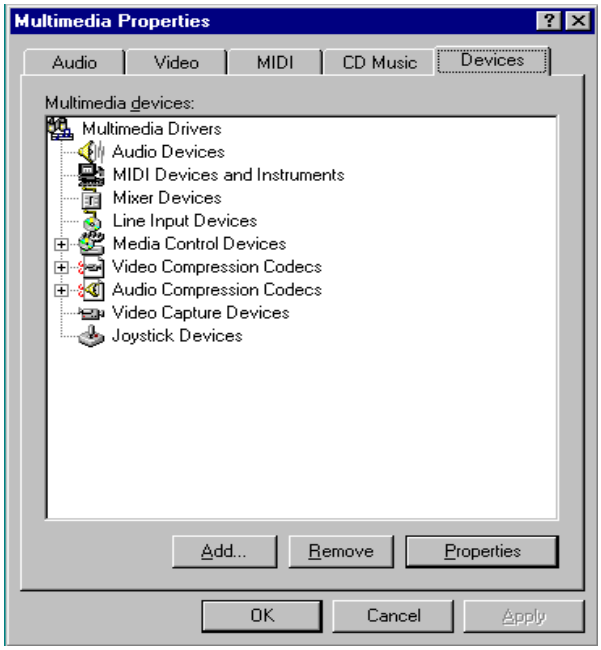
The driver installation may be performed by the following steps:

1. Start the control panel by clicking the '*Start*' button, click '*Settings*' and '*Control Panel*' from the sub-menu.

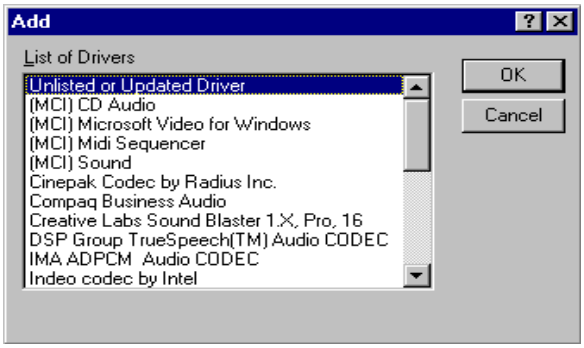
2. Double click the '*Multimedia*' icon in the control panel as shown below:



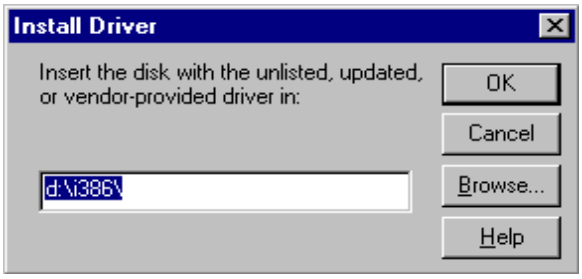
3. On the Multimedia properties window, select the '*Devices*' tab as shown below:



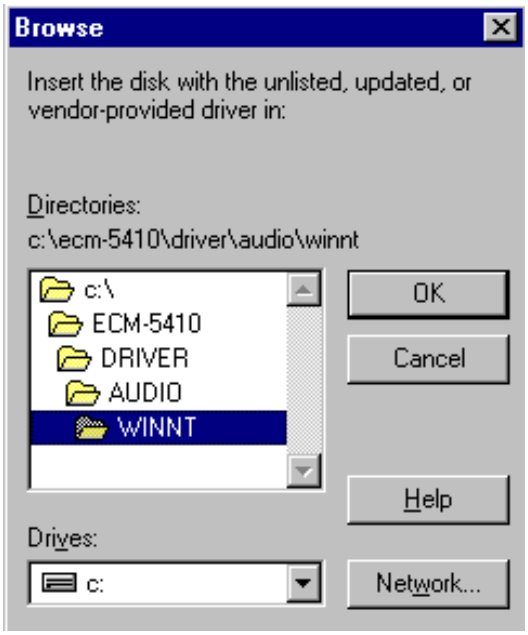
4. Click the '*Add…*' button and the following window should appear.



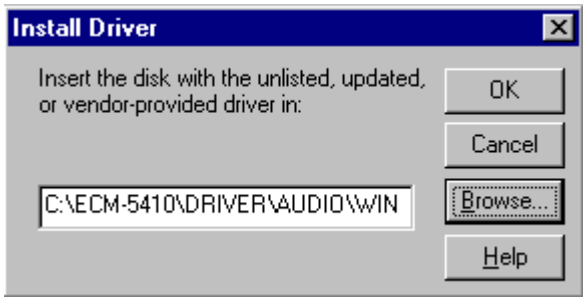
5. Select the '*Unlisted or Updated Driver*' to install the Audio driver from the supporting CD-ROM. The following window should then appear.



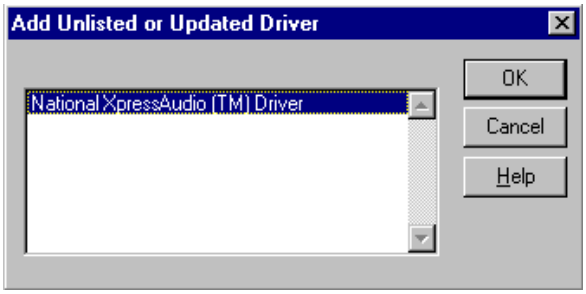
6. Click '*Browse…*' to specify the directory of Audio driver as shown below.



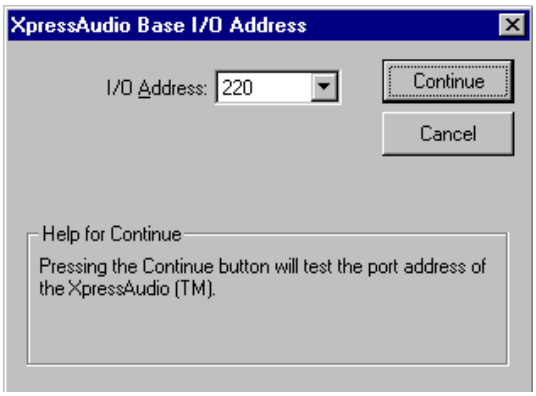
7. Insert the attached supporting CD-ROM. The directory of Audio driver may now be entered.

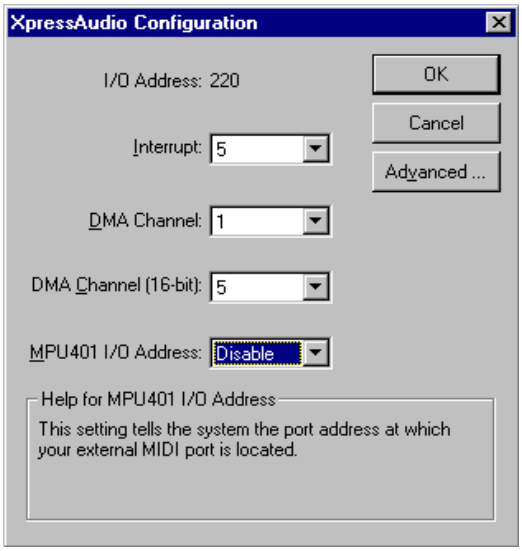


8. The Audio driver should now be listed as shown below. Click '*OK*' to accept.



9. I/O address, interrupt, and DMA channel may now be configured. But the MPU401 I/O Address need to set disable. An example is shown below.

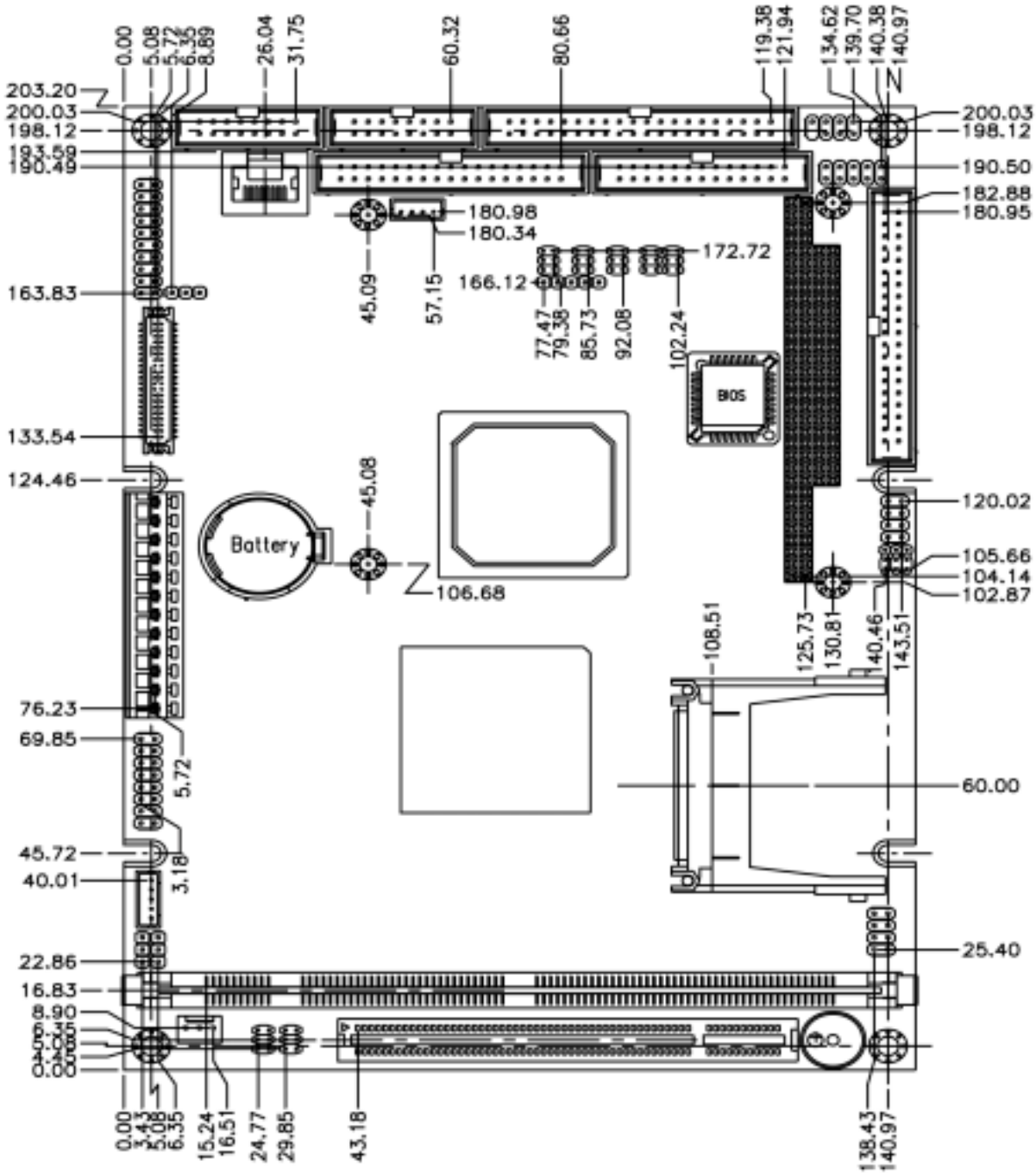

XpressAudio Base I/O Address
I/O Address: 220
Continue
Cancel
Help for Continue
Pressing the Continue button will test the port address of the XpressAudio (TM).



10. Click '*OK*' and close the '*Install Driver*' and '*Multimedia Properties*' windows by clicking the '*Close*' button in each window.

11. After closing the '*Multimedia Properties*' window, the computer must be restarted for the changes to take effect.

6. Measurement Drawing



Appendix A: BIOS Revisions

BIOS Rev.

New Features

Bugs/Problems Solved

Known Problems

Appendix B: System Resources

Memory Map

The following table indicates memory map of EBC-5410. The address ranges specify the runtime code length.

Address Range	Description	Note
00000000h-0009FFFFh	System board extension for PnP BIOS	
000A0000h-000AFFFFh	National Semiconductor XpressGRAPHICS ™	
000B0000h-000BFFFFh	National Semiconductor XpressGRAPHICS ™	
000C0000h-000C7FFFh	National Semiconductor XpressGRAPHICS ™	
000C8000h+000C9FFFh	Motherboard resources	
000CA000h-000CBFFFh	Motherboard resources	
000E0000h-000EFFFFh	Motherboard resources	
000F0000h-000F3FFFh	Motherboard resources	
000F4000h-000FFFFFh	Motherboard resources	
00100000h-07BFFFFFh	System board extension for PnP BIOS	
40008000h-4000FFFFh	System board extension for PnP BIOS	
40010000h-40010FFFh	System board extension for PnP BIOS	
40011000h-4001107Fh	National XpressAUDIO ™ PCI bridge	
40012000h-400120FFh	National Cx5530 ACPI bridge	
40018000h-407FFFFFh	System board extension for PnP BIOS	
40800000h-40FFFFFFh	National Semiconductor XpressGRAPHICS ™	
41000000h-41017FFFh	System board extension for PnP BIOS	
D8000000h-D80000FFh	Realtek RTL8139(A/B/C/8130) PCI Fast Ethernet NIC	
D8004000h-D8004FFFh	Compaq PCI to USB open host controller	
FFFC0000h-FFFFFFFFh	System board extension for PnP BIOS	

Note:

The usage of these I/O addresses depends on the choices made in the BCM setup screen. The I/O addresses are fully usable for PC/104 interface if the corresponding on-board unit is disabled in the setup screen.

I/O – Map

The board incorporates a fully ISA Bus Compatible slave interface. The drive capabilities allow for up to four external PC/104 modules to be driven without external data buffers. The accessible I/O area on the ISA-bus is 64Kbytes with 16 address bits, whereas the accessible memory area is 16Mbytes with 24 address bits.

Certain I/O addresses are subject to change during boot as PnP managers may relocate devices or functions. The addresses shown in the table are typical locations.

I/O Port	Description	Note
0000h-000Fh	Direct memory access controller	
0020h-0021h	Programmable interrupt controller	
0040h-0043h	System timer	
0060h-0060h	Standard 101/102-Key or Microsoft natural keyboard	
0061h-0061h	System speaker	
0064h-0064h	Standard 101/102-Key or Microsoft natural keyboard	
0070h-0071h	System CMOS/Real time clock	
0081h-0083h	Direct memory access controller	
0087h-0087h	Direct memory access controller	
0089h-008Bh	Direct memory access controller	
008Fh-0091h	Direct memory access controller	
00A0h-00A1h	Programmable interrupt controller	
00C0h-00DFh	Direct memory access controller	
00F0h-00FFh	Numeric data processor	
01F0h-01F7h	Primary IDE controller (single fifo)	
01F0h-01F7h	Standard dual PCI IDE controller	
0220h-022Fh	National XperssAUDIO™ 16-bit sound	
02E8h-02EFh	Communications Port (COM4)	
02F8h-02FFh	Communications Ports (COM2)	
0330h-0331h	National XpressAUDIO™ 16-bit sound	
0378h-037Fh	ECP printer port (LPT1)	
0388h-038Bh	National XpressAUDIO™ 16-bit sound	
03B0h-03BBh	National Semiconductor XpressGRAPHICS™	
03C0h-03DFh	National Semiconductor XpressGRAPHICS™	
03E8h-03EFh	Communications port (COM3)	
03F2h-03F5h	Standard floppy disk controller	
03F6h-03F6h	Primary IDE controller (single fifo)	
03F6h-03F6h	Standard dual PCI IDE controller	
03F8h-03FFh	Communications port (COM1)	
0400h-0407h	Motherboard resources	
0480h-048Fh	PCI bus	
04D0h-04D1h	PCI bus	
0778h-077Ah	ECP printer port (LPT1)	
0800h-0807h	Motherboard resources	
0CF8h-0CFFh	PCI bus	
E000h-E0FFh	Realtek RTL8139(A/B/C/8130) PCI Fast Ethernet NIC	

Note:

The usage of these I/O addresses depends on the choices made in the BCM setup screen. The I/O addresses are fully usable for PC/104 interface if the corresponding on-board unit is disabled in the setup screen.

Interrupt Usage

The onboard CS5530A provides an ISA compatible interrupt controller with functionality as two 8259A interrupt controllers. The two controllers are cascaded to provide 13 external interrupts. Most of these are used by onboard devices, but a few are available through the PC/104 interface.

The actual interrupt settings depend on the PnP handler, the table below indicates the typical settings.

Interrupt	Description	Note
IRQ0	System timer	
IRQ1	Standard 101/102-Key or Microsoft natural keyboard	
IRQ2	Programmable interrupt controller	
IRQ3	Communications port (COM2)	
IRQ4	Communications port (COM1)	
IRQ5	Communications port (COM3)	
IRQ6	Standard floppy disk controller	
IRQ7	ECP printer port (LPT1)	
IRQ8	System CMOS/Real time clock	
IRQ9	National XpressAUDIO™ 16-bit sound	
IRQ10	Communications port (COM4)	
IRQ10	IRQ holder for PCI steering	
IRQ11	Realtek RTL8139(A/B/C/8130) PCI Fast Ethernet NIC	
IRQ11	IRQ holder for PCI steering	
IRQ11	Compaq PCI to USB open host controller	
IRQ12	PS/2 compatible mouse port	
IRQ13	Numeric data processor	
IRQ14	Primary IDE controller (single fifo)	
IRQ14	Standard dual PCI IDE controller	

Note:

1. The usage of these interrupts depends on the choices made in the BCM setup screen. The interrupts are fully useable for PC/104 interface if the corresponding on-board unit is disabled in the BIOS setup.
2. These interrupt lines are managed by the PnP handler and are subject to change during system initialisation.
3. IRQ14 is routed directly from the IDE hard disk connector to the PC-AT bus.
4. Disabling the hard disk controller in the BCM setup screen may not release the interrupt line.

DMA-channel Usage

The DMA circuitry incorporates the functionality of two 8237 DMA controllers with seven programmable channels. The controllers are referenced DMA Controller 1 for channels 0-3 and DMA Controller 2 for channels 4-7. Channel 4 is by default used to cascade the two controllers.

Channels 0-3 are hardwired to 8-bit count-by-bytes transfers and channels 5-7 to 16-bit count-by-bytes transfers.

The onboard CS5530A provides 24-bit addressing with the 16 least significant bits [15:0] in the Current register and the most significant bits [24:16] in the Page register.

DMA-channel	Description	Note
DMA0	Available in PC/104 interface	
DMA1	National XpressAUDIO™ 16-bit sound	
DMA2	Standard floppy disk controller	1
DMA3	Parallel port, if using ECP mode	1
DMA4	Used for cascading	
DMA5	National XpressAUDIO 16-bit sound	
DMA6	Available for PC/104 interface	
DMA7	Available for PC/104 interface	

Note:

The usage of these DMA-channels depends on the choices made in the BCM setup screen. The DMA-channels are fully usable for PC/104 interface if the corresponding on-board unit is disabled in the setup screen.

Appendix C: Programming the Watchdog Timer

Introduction

The EBC-5410 onboard watchdog timer uses a 8-bit counter, so it has 256 resolution and the time range is from 32 seconds to 254 minutes with a resolution of 1 minute. When the timer is setting and time-out occur, it will trigger the hardware reset signal, a system reset will happen.

Configure Register

The EBC-5410 onboard watchdog timer function is carried by the I/O chip Winbond W83977EF. If you want to use this function in your program, you have to know how to read/write the W83977EF configuration register. The onboard W83977EF I/O chip decode address is 370h, it is index port and data port is 371h. The read/write register methods are write register number to index port ,then read/ write data from/to data port.

About how to program the W83977EF register and the procedure of using watchdog function are describe as follow.

Program W83977EF register :

1. Unlock W83977EF I/O chip and enter configuration mode
2. Select Logical Device.
3. Select register number.
4. Read/Write data from/to register.
5. Lock W83977EF I/O chip and exit from configuration mode.

Programming Watchdog Timer

To Unlock/Lock the W83977EF and Enter/exit configuration mode is to write a specific value to I/O Port 370h.

Unlock W83977EF : write value 87h to I/O port 370h twice.

Lock W83977EF : write value aah to I/O port 370h.

Program watchdog procedure :

1. Unlock W83977EF I/O chip and enter configuration mode.

```
write twice unlock value(87h) to port 370h
ex: outportb(0x370, 0x87);
    outportb(0x370, 0x87);
```

2. Set register 30h of logical device 8 to 1 to activate the timer.
   Logical Device 8: Register number 30h (CR30)
   00h : timer inactive
   01h : timer active

```
write value 7 to port 370       /* register 7(logical device switch register)*/
write value 8 to port 371       /* write value 8 to enter logical device 8   */
write value 30 to port 370
write value 01 to port 371
  ex: outportb(0x370, 0x07);
      outportb(0x371, 0x08);
      outportb(0x370, 0x30);
      outportb(0x371, 0x01);
```

3. write time-out value(01h ~ FFh) to timer register (F2h).
   Logical Device 8: Register number F2h (CRF2)
   00h : Time-out Disable
   01h : Time-out occurs after 32 seconds
   02h : Time-out occurs after 1 minute 32 seconds
   03h : Time-out occurs after 2 minute 32 seconds
   04h : Time-out occurs after 3 minute 32 seconds
   05h : Time-out occurs after 4 minutes 32 seconds
   .
   .
   FFh : Time-out occurs after 127 minutes 16 seconds

```
write register number F2h to port 370h
write time-out value to port 371h
  ex: outportb(0x370, 0xF2);    /* register F2 (Watchdog Timer)    */
      outportb(0x371, 0x01);    /* time-out value 01 == 32 seconds */
```

4. Lock W83977EF I/O chip, exit configuration mode
   write lock value (AAh) to port 370h
   ex: outportb(0x370, 0xAA);

Followings show two examples of programming the watchdog timer with 32 seconds time interval in both Micro-assembly and C language.

Demo Program 1 (Micro-Assembly Language)

```
;;=============================================================
;; Title          : EBC-5410 WatchDog Timer Demo Program (32 seconds)
;; Company  : BCM Advanced Research
;; Date          : 06/26/2001
;;=============================================================
        .model  small
        .code

W83977_IO_PORT  DW     370H
UNLOCK_ID       DB     087h
LOCK_ID         DB     0AAH
;;-------------------------------------------------
;; Main Program start
;;-------------------------------------------------
WatchDog PROC

;; Set Logic Device 8 Active
        mov     bl, 8                ;; Logic Device 8
        mov     al, 30h               ;; Register 30h
        mov     ah, 01h               ;; Active --> 01h, InActive --> 00h
        call    W977_Register_Set

;; Set watchdog time-out value = 1  (16 seconds)
        mov     bl, 8                ;; Logic Device 8
        mov     al, 0F2h              ;; Register F2h
        mov     ah, 01h               ;; 01h ~ FFh  == 0:32 ~ 254:32
        call    W977_Register_Set

        mov     ah,4ch                ;; Retuen to DOS
        int     21h
        ret
WatchDog ENDP
;;-------------------------------------------------
```

```
;;-------------------------------------------------
;; unlock W83977 register program mode
;;-------------------------------------------------
Unlock_977 proc
        cli
        push    ax
        push    dx
        mov     al, UNLOCK_ID
        mov     dx, cs:W83977_IO_PORT
        out     dx, al                  ;; write Unlock_ID to w83977 twice
        out     dx, al
        jmp     $+2
        jmp     $+2
        pop     dx
        pop     ax
        ret
Unlock_977 endp
;;-------------------------------------------------

;;-------------------------------------------------
;; lock w83977 register program mode
;;-------------------------------------------------
Lock_977 proc
        push    ax
        push    dx
        mov     dx, cs:W83977_IO_PORT
        mov     al, LOCK_ID
        out     dx, al
        pop     dx
        pop     ax
        ret
Lock_977 endp
;;-------------------------------------------------
```

```
;;-----------------------------------------------
;; Select W83977 I/O chip Logic Device
;; bl : Device Number
;;-----------------------------------------------
Set_Device proc
        push    ax
        push    dx
        mov     dx, cs:W83977_IO_PORT
        mov     al, 07h
        out     dx, al
        inc     dx
        mov     al, bl
        out     dx, al
        pop     dx
        pop     ax
        ret
Set_Device endp
;;-----------------------------------------------

;;-----------------------------------------------
;; Write data to W83977 Register
;;  al : register number
;;  ah : data
;;  bl : device number
;;-----------------------------------------------
W977_Register_Set PROC
        push    dx
        call    Unlock_977
        call    Set_Device
        mov     dx, cs: W83977_IO_PORT
        out     dx, al
        mov     al, ah
        inc     dx
        out     dx, al
        call    Lock_977
        pop     dx
        ret
W977_Register_Set ENDP
;;-----------------------------------------------

        end     WatchDog
```

Demo Program 2 (C Language)

```
//=============================================================
//  Title   : EBC-5410 WatchDog Timer Test Utility
// Company  : BCM Advanced Research
// Programer: Winston Kang
// Version  : 1.0
// Date     : 06/26/2001
// Compiler : Borland C ++
//=============================================================

#include <stdio.h>
#include <stdlib.h>
#include <conio.h>

#define IO_INDEX_PORT    0x370
#define IO_DATA_PORT     0x371
#define UNLOCK_DATA      0x87
#define LOCK_DATA        0xAA
#define DEVICE_REGISTER  0x07

void EnterConfigMode()
{
   outportb(IO_INDEX_PORT, UNLOCK_DATA);
   outportb(IO_INDEX_PORT, UNLOCK_DATA);
}

void ExitConfigMode()
{
   outportb(IO_INDEX_PORT, LOCK_DATA);
}

void SelectDevice(unsigned char device)
{
   outportb(IO_INDEX_PORT, DEVICE_REGISTER);
   outportb(IO_DATA_PORT, device);
}

unsigned char ReadAData(short int reg)
{
   outportb(IO_INDEX_PORT, reg);
   return (inportb(IO_DATA_PORT));
}

void WriteAData(unsigned char reg, unsigned char data)
{
   outportb(IO_INDEX_PORT, reg);
   outportb(IO_DATA_PORT, data);
}
```

```
void SetWatchDogTime(unsigned char time_val)
{
    EnterConfigMode();
    SelectDevice(8);
        //Set Register 30
        //Set Device Mode to Active
    WriteAData(0x30, 0x01);
        //Set Register F2
        //Set Watch-Dog Timer 1~ 256 steps
    WriteAData(0xF2, time_val);
    ExitConfigMode();
}

void main(int argc, char* argv[])
{
  int time_value=0;
  char *ptr;

  printf("WinBond 83977EF WatchDog Timer Test Utility Version 1.0 \n");
  printf("Copyright (c) 2000 BCM Advanced Research\n");
  printf("(only support EBC-5410 board and will reset the system)\n");
  if (argc == 1)
   {  printf("\n Syntax: 5410WD  [step] \n");
      printf(" step range : 1 ~ 255 steps \n");
      printf(" timer range: 0:32 ~ 254:32 (min:sec) \n");
      return ;
    }
  if (argc > 1)
   {
      ptr = argv[1];
      time_value = atoi(ptr);
   }
  if (time_value > 0 && time_value < 256)
   {
      SetWatchDogTime((unsigned char) time_value);
      printf("Watch Dog reset Timer set up : %02d:%02d ",(time_value-1),
                      32);
   }
}
```

Appendix D: AWARD BIOS Error Message

During the power-on self test (POST), the BIOS either sounds a beep code or displays a message when it detects a correctable error.

Following is a list of POST messages for the ISA BIOS kernel. Specific chipset ports and BIOS extensions may include additional messages. An error message may be followed by a prompt to press F1 to continue or press DEL to enter Setup.

Beep

Currently the only beep code indicates that a video error has occurred and the BIOS cannot initialize the video screen to display any additional information. This beep code consists of a single long beep followed by two short beeps.

BIOS ROM Checksum Error – System Halted

The checksum of ROM address F0000H-FFFFFH is bad.

CMOS Battery Failed

CMOS battery is no longer functional. Contact your system dealer for a replacement battery.

CMOS Checksum Error

Checksum of CMOS is incorrect. This can indicate that CMOS has become corrupt. This error may have been caused by a weak battery. Check the battery and replace if necessary.

Disk Boot Failure, Insert System Disk and Press Enter

No boot device was found. This could mean that either a boot drive was not detected or the drive does not contain proper system boot files. Insert a system disk into Drive A: and press <Enter>. If you assumed the system would boot from the hard drive, make sure the controller is inserted correctly and all cables are properly attached. Also be sure the disk is formatted as a boot device. Then reboot the system.

Diskette Drives or Types Mismatch Error – Run Setup

Type of diskette drive installed in the system is different from the CMOS definition. Run Setup to reconfigure the drive type correctly.

Display Switch is Set Incorrectly.

The display switch on the motherboard can be set to either monochrome or color. This message indicates the switch is set to a different setting than indicated in Setup. Determine which setting is correct, and then either turn off the system and change the jumper, or enter Setup and change the VIDEO selection.

Display Type has Changed Since Last Boot

Since last powering off the system, the display adapter has been changed. You must configure the system for the new display type.

EISA Configuration Checksum Error
Please Run EISA Configuration Utility

The EISA non-volatile RAM checksum is incorrect or cannot correctly read the EISA slot. This can indicate either the EISA non-volatile memory has become corrupt or the slot has been configured incorrectly. Also be sure the card is installed firmly in the slot.

EISA Configuration Is Not Complete
Please Run EISA Configuration Utility

The slot configuration information stored in the EISA non-volatile memory is incomplete.

Note: When either of these errors appear, the system will boot in ISA mode, which allows you to run the EISA Configuration Utility.

Error Encountered Initializing Hard Drive

Hard drive cannot be initialized. Be sure the adapter is installed correctly and all cables are correctly and firmly attached. Also be sure the correct hard drive type is selected in Setup.

Error Initializing Hard Disk Controller

Cannot initialize controller. Make sure the cord is correctly and firmly installed in the bus. Be sure the correct hard drive type is selected in Setup. Also check to see if any jumper needs to be set correctly on the hard drive.

Floppy Disk(s) Fail

Cannot find or initialize the floppy drive controller or the drive. Make sure the controller is installed correctly. If no floppy drives are installed, be sure the Diskette Drive selection in Setup is set to NONE or AUTO.

Floppy Disk(s) fail (80) → Unable To Reset Floppy Subsystem

Floppy Disk(s) fail (40) → Floppy Type Dismatch

Hard Disk(s) fail (80) → HDD Reset Failed

Hard Disk(s) fail (40) → HDD Controller Diagnostics Failed

Hard Disk(s) fail (20) → HDD Initialization Error

Hard Disk(s) fail (10) → Unable To Recalibrate Fixed Disk

Hard Disk(s) fail (08) → Sector Verify Failed

Invalid EISA Configuration
Please Run EISA Configuration Utility

The non-volatile memory containing EISA configuration information was programmed incorrectly or has become corrupt. Re-run EISA configuration utility to correctly program the memory.

NOTE: When this error appears, the system will boot in ISA mode, which allows you to run the EISA Configuration Utility.

Keyboard is Locked Out – Unlock the Key

BIOS detect the keyboard is locked. P17 of keyboard controller is pulled low.

Keyboard Error or No Keyboard Present

Cannot initialize the keyboard. Make sure the keyboard is attached correctly and no keys are being pressed during the boot.

Keyboard Error or No Keyboard Present

Cannot initialize the keyboard. Make sure the keyboard is attached correctly and no keys are pressed during POST. To purposely configure the system without a keyboard, set the error halt condition in Setup to HALT ON ALL, BUT KEYBOARD. The BIOS then ignores the missing keyboard during POST.

Memory Address Error at ...

Indicates a memory address error at a specific location. You can use this location along with the memory map for your system to find and replace the bad memory chips.

Memory parity Error at ...

Indicates a memory parity error at a specific location. You can use this location along with the memory map for your system to find and replace the bad memory chips.

Memory Size Has Changed Since Last Boot

Memory has been added or removed since the last boot. In EISA mode use Configuration Utility to reconfigure the memory configuration. In ISA mode enter Setup and enter the new memory size in the memory fields.

Memory Verify Error at ...

Indicates an error verifying a value already written to memory. Use the location along with your system's memory map to locate the bad chip.

Manufacturing Post Loop

System will repeat POST procedure infinitely while the P15 of keyboard controller is pull low. This is also used for M/B burn in test.

Memory Test Fail

BIOS reports the memory test fail if the onboard memory is tested error.

Offending Address Not Found

This message is used in conjunction with the I/O CHANNEL CHECK and RAM PARITY ERROR messages when the segment that has caused the problem cannot be isolated.

Offending Segement

This message is used in conjunction with the I/O CHANNEL CHECK and RAM PARITY ERROR messages when the segment that has caused the problem has been isolated.

Press a Key To Reboot

This will be displayed at the bottom screen when an error occurs that requires you to reboot. Press any key and the system will reboot.

Press F1 To Disable NMI, F2 To Reboot

When BIOS detects a Non-maskable Interrupt condition during boot, this will allow you to disable the NMI and continue to boot, or you can reboot the system with the NMI enabled.

RAM Parity Error - Checking for Segment ...

Indicates a parity error in Random Access Memory.

Should Be Empty But EISA Board Found
Please Run EISA Configuration UTILITY

A valid board ID was found in a slot that was configured as having no board ID.

NOTE; When this error appears, the system will boot in ISA mode, which allows you to run the EISA Configuration Utility.

Should Have EISA Board But Not Found
Please Run EISA Configuration Utility

The board installed is not responding to the ID request, or no board ID has been found in the indicated slot.

NOTE: When this error appears, the system will boot in ISA mode, which allows you to run the EISA Configuration Utility.

Slot Not Empty

Indicates that a slot designated as empty by the EISA Configuration Utility actually contains a board.

NOTE: When this error appears, the system will boot in ISA mode, which allows you to run the EISA Configuration Utility.

System Halted, (CTRL-Alt-Del) To Reboot ...

Indicates the present boot attempt has been aborted and the system must be rebooted. Press and hold down the CTRL and ALT keys and press DEL.

Wrong Board In Slot
Please Run EISA Configuration Utility

The board ID does not match the ID stored in the EISA non-volatile memory.

NOTE: When this error appears, the system will boot in ISA mode, which allows you to run the EISA Configuration Utility.

Appendix E: AWARD BIOS POST Codes

Note: ISA POST codes are outputted to port address 80h

Code (hex)	Description
C0	1. Turn off OEM specific cache, shadow... 2. Initialize all the standard devices with default values standard devices includes: -DMA controller (8237) -Programmable Interrupt Controller (8259) -Programmable Interval Timer (8254) -RTC chip
C1	Auto-detection of onboard DRAM & Cache
C3	1. Test system BIOS checksum 2. Test the first 256K DRAM 3. Expand the compressed codes into temporary DRAM area including the compressed System BIOS & Option ROMs
C5	Copy the BIOS from ROM into E0000-FFFFF shadow RAM so that POST will go faster
01-02	Reserved
03	Initialize EISA registers (EISA BIOS only)
04	Reserved
05	1. Keyboard Controller Self-Test 2. Enable Keyboard Interface
06	Reserved
07	Verifies CMOS's basic R/W functionality
BE	Program defaults values into chipset according to the MODBINable Chipset Default Table
09	1. Program the configuration register of Cyrix CPU according to the MODBINable Cyrix Register Table 2. OEM specific cache initialisation (if needed)
0A	1. Initialize the first 32 interrupt vectors with corresponding Interrupt handlers Initialize INT no from 33-120 with Dummy(Spurious) Interrupt Handler 2. Issue CPUID instruction to identify CPU type 3. Early Power Management initialization (OEM specific)

Note: This POST codes is for boot block

Code (hex)	Description
C0	1. Turn off OEM specific cache, shadow... 2. Initialize all the standard devices with default values standard devices includes: -DMA controller (8237) -Programmable Interrupt Controller (8259) -Programmable Interval Timer (8254) -RTC chip
C1	Auto-detection of onboard DRAM & Cache
C3	Checking checksum of compressed code
C5	Copy the BIOS from ROM into E0000-FFFFF shadow RAM so that POST will go faster
01	Clear base memory 0~640K
0C	Initial interrupt vector 00-1FH
0D	Initial ISA VGA
41H	Enable FDD and detect media type
FFH	Boot from FDD

Note: This POST codes is for Non-Compressed Version only

Code (hex)	Description
01-02	Reserved
C0	Turn off OEM specific cache, shadow...
03	1. Initialize EISA registers (EISA BIOS only) 2. Initialize all the standard devices with default values Standard devices includes: -DMA controller (8237) -Programmable Interrupt Controller (8259) -Programmable Interval Timer (8254) -RTC chip
04	Reserved
05	1. Keyboard Controller Self-Test 2. Enable Keyboard Interface
06	Reserved
07	Verifies CMOS's basic R/W functionality
BE	Program defaults values into chipset according to the MODBINable Chipset Default Table
C1	Auto-detection of onboard DRAM & Cache
C5	Copy the BIOS from ROM into E0000-FFFFF shadow RAM so that POST will go faster
08	Test the first 256K DRAM
09	1. Program the configuration register of Cyrix CPU according to the MODBINable Cyrix Register Table 2. OEM specific cache initialization (if needed)
0A	1. Initialize the first 32 interrupt vectors with corresponding Interrupt handlers Initialize INT no from 33-120 with Dummy(Suprious) Interrupt Handler 2. Issue CPUID instruction to identify CPU type 3. Early Power Management initialization (OEM specific)

Note: This POST codes all of Compress Version & Non-Compress Version

Code (hex)	Description
0B	1. Verify the RTC time is valid or not 2. Detect bad battery 3. Read CMOS data into BIOS stack area 4. PnP initializations including (PnP BIOS only) -Assign CSN to PnP ISA card -Create resource map from ESCD 5. Assign IO & Memory for PCI devices (PCI BIOS only)
0C	Initialization of the BIOS Data Area (40 : 00 – 40:FF)
0D	1. Program some of the Chipset's value according to Setup. (Early Setup Value Program) 2. Measure CPU speed for display & decide the system clock speed 3. Video initialization including Monochrome, CGA, EGA/VGA. If no display device found, the speaker will beep which consists of one single long beep followed by two short beeps.
0E	1. Initialize the APIC (Multi-Processor BIOS only) 2. Test video RAM (If Monochrome display device found) 3. Show messages including: -Award Logo, Copyright string, BIOS Date code & Part No. -OEM specific sign on messages -Energy Star Logo (Green BIOS ONLY) -CPU brand, type & speed -Test system BIOS checksum(Non-Compress Version only)
0F	DMA channel 0 test
10	DMA channel 1 test
11	DMA page registers test
12-13	Reserved
14	Test 8254 Timer 0 Counter 2.
15	Test 8259 interrupt mask bits for channel 1
16	Test 8259 interrupt mask bits for channel 2
17	Reserved
19	Test 8259 functionality
1A-1D	Reserved
1E	If EISA NVM checksum is good, execute EISA initialization (EISA BIOS only)
1F-29	Reserved
30	Detect Base Memory & Extended Memory Size
31	1. Test Base Memory from 256K to 640K 2. Test Extended Memory from 1M to the top of memory

Code (hex)	Description
32	1. Display the Award Plug & Play BIOS Extension message (PnP BIOS only) 2. Program all onboard super I/O chips (if any) including COM ports, LPT ports, FDD port... according to setup value
33-3B	Reserved
3C	Set flag to allow users to enter CMOS Setup Utility
3D	1. Initialize Keyboard 2. Install PS2 mouse
3E	Try to turn on Level 2 cache **Note:** Some chipset may need to turn on the L2 cache in this stage. But usually, the cache is turn on later in POST 61h
BF	1. Program the rest of the Chipset's value according to Setup. (Later Setup Value Program) 2. If auto-configuration is enabled, programmed the chipset with pre-defined values in the MODBINable Auto-Table
41	Initialize floppy disk drive controller
42	Initialize Hard drive controller
43	If it is a PnP BIOS, initialize serial & parallel ports
44	Reserved
45	Initialize math coprocessor.
46-4D	Reserved
4E	If there is any error detected (such as video, kb...), show all the error messages on the screen & wait for user to press <F1> key
4F	1. If password is needed, ask for password 2. Clear the Energy Star Logo (Green BIOS only)
50	Write all CMOS values currently in the BIOS stack area back into the CMOS
51	Reserved

Code (hex)	Description
52	1. Initialize all ISA ROMs 2. Later PCI initializations (PCI BIOS only) -assign IRQ to PCI devices -initialize all PCI ROMs 3. PnP Initializations (PnP BIOS only) -assign IO, Memory, IRQ & DMA to PnP ISA devices -initialize all PnP ISA ROMs 4. Program shadows RAM according to Setup settings 5. Program parity according to Setup setting 6. Power Management Initialization -Enable/Disable global PM -APM interface initialization
53	1. If it is NOT a PnP BIOS, initialize serial & parallel ports 2. Initialize time value in BIOS data area by translate the RTC time value into a timer tick value
60	Setup Virus Protection (Boot Sector Protection) functionality according to Setup setting